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2 January 1986

USSR REPORT  
 LIFE SCIENCES  
 BIOMEDICAL AND BEHAVIORAL SCIENCES

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CHARACTERISTICS OF EFFECTS OF MICROBIOLOGICAL MEANS OF PLANT PROTECTION  
ON ORGANISM

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 6, Jun 85  
(manuscript submitted 16 Nov 84) pp 76-81

[Article by I. A. Ivanova, Riga Medical Institute: "Characteristics of the  
Effects of Microbiological Means of Plant Protection on an Organism"]

[Text] At present, in the microbiological industry, new enterprises are being created for the manufacture of effective agents against plant pests. The widespread use of chemical means of plant protection has played a positive role in increasing productivity. However, the high toxicity and the capacity to accumulate in an organism are negative factors in the use of many chemical preparations [28].

The microbiological preparations currently recommended, as a rule, are of low toxicity and are less dangerous to the organism. Compared with chemical preparations, they do not have a destructive action on living organisms, do not disrupt the bonds of biocenosis, and do not affect the most important ecological factors [14].

The microbiological method of combatting pests is very promising, which is explained by the ever growing interest in it in many countries. Nevertheless, before permitting the use of microbiological agents, it is necessary to thoroughly study the characteristics of microorganisms artificially introduced into the environment. Therefore, studying the effects of biological means of protecting agricultural crops on man and warm-blooded animals is of doubtless scientific and practical interest, especially since only a few works have been devoted to this problem. In addition, the existing data in literature regarding their pathogenicity are extremely contradictory. This emphasizes the importance of the correct approach to normalizing microbe preparations, which is of great importance not only from the point of view of hygiene and occupational pathology, but also of environmental protection.

The bacterial preparations entobacterin [entobakterin], dendrobacillin [dendrobatsillin], insectin [insektin], and other *Bacillus thuringiensis* derivatives have been successfully used against insect pests. This species of bacteria, by basic characteristics, belongs to the group of aerobic spore formers *Bac. cereus*, whose role in the pathology of man has grown recently [24, 32-34].

In plants treated with entobacterin (cabbages, apples, currants), the amount of bacteria can vary, depending on the type of product, length of treatment, weather, etc. In one year the products can contain from tens to hundreds of thousands of bacteria [5].

Studying the seeding ability of *Bac. thuringiensis* from the plants at various times after treatment showed the high resistance of the bacteria to the external effects of nature. A significant amount of bacteria was found on fruit several months after treatment.

The use of biological insecticides is associated with the dangers of reproduction of the organisms [21].

One also can not exclude the role of individual toxins manufactured by *Bac. thuringiensis* in the pathogenesis of nonalimentary infectious diseases caused by these microbes.

In studying the effects of microbe preparations on the immune system, changes in the indicators of the functional state of animals by cytohematological criterion group (leukopenia on exposure to entobacterin, leukocytosis on exposure to exotoxin) have been established, as well as indicators of the overall immunological reactivity (increase in hemolytic, lysozymic, and complementary activity of blood serum after exposure to entobacterin) [15].

R. Ye. Kogay demonstrated the change in the immunological reactivity of animals when exposed to dendrobacillin [11].

During normalization of the microbe preparations in our laboratory, their effect on the functional condition of T-cells and the composition of immunoglobulins of the blood of laboratory animals was revealed, manifesting itself in a weakening of the activity of T-cells to rosette formation and activation of synthesis of IgG- and IgA-class immunoglobulins [4].

#### General Characteristics of the Effects of Biological Insecticides

The insecticide activity of preparations based on *Bac. thuringiensis* is caused by delta-endotoxin, formed during sporulation, which is in the form of a crystalline occlusion within the sporangium [20]. The presence of this paraspore body serves as the systematic differentiation of *Bac. thuringiensis* as a species, including 14 serotypes up to the present time [26]. Serotypes 1-13 have insecticide activity against Lepidoptera, and the recently discovered serotype 14 (*israelensis*) is active against mosquito larvae and other Diptera [25]. The delta-endotoxin is a protein, possibly including carbohydrates. The crystal is weakly soluble and is made up of polypeptides [31]. It is a protoxin and is activated in the intestines of susceptible insects by protease. The endotoxin exerts an activating effect on the mitochondrial ATPase [adenosine triphosphatase] of grubs [10]. Its mode of action, apparently, is associated with an increase in vacuole formation in cells of the larva [22]. When the delta-endotoxin was working on the primary cultures of the epithelium of the larva of animals, swelling of cells, the formation of

vacuoles in them, and a reduction in the concentration of ATP were observed [23]. It is suggested that the delta-toxin of *Bac. thuringiensis* disrupts the overall ion regulation of the cell [29].

The second component, produced by several serotypes of *Bac. thuringiensis*, the beta-exotoxin, is a nucleotide with a broad effective range, including vertebrates [16, 27].

The little-studied alpha-exotoxin is a thermally labile protein, active against insects and mice. In addition, *Bac. thuringiensis* produces exoenzymes with insecticide activity that participates in pathogenesis.

R. Ye. Kogay [11] explains the resorptive action of dendrobacillin on warm-blooded animals as the action of endo- and exotoxins that form during the decomposition of the *thuringiensis* bacteria in the animal, under the effect of the organism's immune powers, performing a protective function (macrophages, lymphocytes, corpulent cells, etc.).

K. E. Kuksh [12] demonstrated the great antigenicity of the protein crystals of *Bac. thuringiensis*, as compared to cells of bacteria and their spores. Therefore, one can assume that if the toxic effect of the *thuringiensis* bacteria is caused by endo- and exotoxins, then the sensitizing effect, to a great degree, belongs to endotoxins (crystals) [12].

Unlike bacterial preparations, the insecticide activity of entomopathogenic fungi is caused by the formation of mycelium within the nutrient substrate [30]. In affected insects, the mycelium breaks down into separate elements -- hyphal bodies. These elements are carried by the hemolymph throughout the body of the host and gradually fill it up, replacing destroyed tissue. Growth of the fungus continues until all internal organs and tissue are destroyed [3].

The expulsion of mature conidia, with considerable force, to a distance exceeding their size by thousands of times, is a characteristic of entomophthoric fungi (Fam. Entomophthora). The thrust arises when the conidia carrier bursts from the pressure of plasma below the dividing wall that had been formed [18]. Besides conidia, entomophthoric fungi form quiescent spores.

Conidia spores of the fungus *Beauveria bassiana* (Fam. Moniliaceae), having entered the body of an insect, germinate and penetrate into the cavity, dissolving the skin with enzymes. The mycelium permeates the insect's entire body, forming a layer of conidia carriers with conidia on the surface of the body [19].

With regard to the danger of the effects of fungous preparations on warm-blooded animals and man, there are only a few works showing the possibility of sensitization emerging in those who work with them [8, 9, 14].

One can assume that the conidia--composed of nitrous substances, polysaccharides, DNA, ash elements, and diaminopicolinic acid--cause the sensitization to fungous preparations, with the exception of spores [13].

#### The Effect of Microbe Preparations on the Health of Workers Manufacturing Them

The large number of microbes in the air in the workplace makes a difference in the reactivity of man, since the living microorganisms themselves have sensitizing properties, and those that are dead, appearing as a denatured protein mass that is extremely complex in its antigenic structure, can cause increased sensitivity in man [9].

However, in a number of the stages in the production process, with the existing degree of air-tightness of equipment or methods of conducting individual operations, the release of microorganisms into the environment of the production shops is inevitable [3].

J. Hall suggested that the allergy to *Bac. bassiana* arises as a result of inhaling spores, but according to the data of E. Dresner, inhaling the spores is not harmful, and G. York established that long sleeves and gloves prevent the allergy when only respirators are insufficient. Proper attire and the careful compounding of the preparations should reduce the harmful effect of this fungus on workers [17].

The diverse preparations produced, discontinuity of the production process, and large number of manual operations (especially in the final stages of production) are characteristic for plants of the microbiological industry. Here, efficient ventilation in the production areas is often lacking. The most unfavorable, with regard to hygiene, are the operations of drying and grinding the preparations and mixing with fillers, during which a large amount of dust of both the prepared products as well as fillers is produced, contributing to air pollution [6].

Pollution of the air in some plants of the microbiological industry significantly exceeds allowable limits. A study of air pollution in production shops revealed the presence of a substantial amount of organic dust and conidia producers. When conducting some operations (loading the seed material into the sterilizer, dumping the seed culture into the handler), the conidia count in the immediate work area reached 40,000 and more per 1 m<sup>3</sup> of air, which significantly exceeded the standard [2].

Staff members from the Hygiene and Occupational Diseases department of the Riga Medical Institute inspected two pilot plants (plants No 1 and No 2) of the All-Union Scientific Research Institute for Microbiological Agents for Plant Protection. An in-depth study of the state of health of workers at the plants was conducted by a team of doctors, comprised of a therapist, neuropathologist, otolaryngologist, ophthalmologist, dermatologist, allergist, and gynecologist. They conducted allergy and immunological studies.

During the medical examinations it was revealed that 50% of the workers suffer from allergic reactions: itchy skin, rash, swollen face, etc. In administrative and supervisory workers these allergic reactions were evident in only 15% of the cases, and they were not observed at all in workers in the control [sample] plant [7].

The sensitization in workers that make these microbiological agents was confirmed by allergy testing: increase in the leukergy phenomenon, lysis of the leukocytes, lowering of the reaction of latex settling of erythrocytes and eosinophiles, lymphocytolysis, and positive skin tests with serotonin.

Approximately 40% of the workers at the bacteriological preparations plant that were examined suffer from acute and chronic conjunctivitis, as well as frequent illnesses of the upper respiratory tract -- among which are sub-atrophic or atrophic rhinolaryngitis. Allergic dermatitis was found in 27% of the workers. Functional disturbances of the nervous system were characteristic, manifested in the form of astheno-autonomic syndrome with expressed vascular disturbances and inflammation [1].

In studying the health of workers that manufacture boverin [boverin], a set of clinical manifestations of allergic sensitization was also noted. Predominant were complaints of itchy skin and periodic rashes. The expression of clinical manifestations of the allergy increased as a function of the length of production work of the worker: they were observed in 15% of those working in production from 1 to 5 years, and in 65% of those with a more prolonged term. In the control group, persons with allergies comprised 5% [9].

The condition of allergic sensitization of workers was confirmed by cell reactions: increase in the percentage of lysed and agglomerated leukocytes, as well as a slowing of the rate of settling of erythrocytes after the addition of latex. The reduction in phagocytic activity of neutrophils to 1.6-1.8% has been established; the percentage of completeness of phagocytosis did not exceed 54-56%.

In the otolaryngological examination of workers of the main group, a significant number of subatrophic and hyperatrophic rhinopharyngitides and vasomotor rhinitides were revealed. The oppressed functions of the ciliated epithelium in 50% of those examined, primarily those with long terms in production, was also significant. Complaints indicative of conjunctivitis were characteristic: during the examination the ophthalmologist diagnosed this illness in 40% of the cases. This illness did not show up in the control group [9].

Thus, the changes in people coming into contact with microbiological means of plant protection, in concentrations exceeding the allowable limits, indicate the negative effect they have on an organism.

In the microbiological industry, the problem of the change in immunological reactivity is primary, against which sensitization to various microbial preparations arises, confirmed by clinical examinations and allergy test data.

For the purpose of revealing the danger to man and establishing allowable limits of concentrations in the air during the manufacture and use of microbiological agents, it is necessary to develop a program for checking newly created preparations on animals, taking into account not only their overall toxicity and allergenic action, but also the immunological hazard criterion.

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ESO: 1840/2063

BIOCHEMISTRY

COMPUTER GRAPHICS EMPLOYED IN MODELING PROTEIN MOLECULES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Sep 85 p 4

[Text] A computer-aided method for modeling the structure of molecules will become a new tool for probing the secrets of matter. Developed by scientists of the Pacific Ocean Institute of Bioorganic Chemistry and the Institute of Automation and Control Processes of the USSR Academy of Sciences' Far East Center, the method makes it possible to produce pictures of molecules of complex protein compounds on the screen of a terminal.

Before one's eyes, the computer 'draws' any of 250 molecules, whose diagrams, consisting sometimes of many thousands of coordinates, are stored in an electronic data bank. Moreover, these drawings can be 'rotated' in all planes and enlarged or reduced; different parts of them can be isolated, and cross-sections can be shown. For great clarity, atoms are colored in contrasting shades, and half-tones create a three-dimensional effect.

Scientists working in the most diverse fields--biologists, chemists, geologists and medical personnel--have immediately become interested in this innovation. After all, until now they were confined to the use of mechanical models to show the structure of molecules. And it takes months of hard work by even an experienced specialist to create such a mock-up.

FTD/SNAP  
/5915  
CSO: 1840/016

UDC 577.15(022+024+03+08):577.352(2+334):541.18.182

MICELLAR ENZYMOLOGY

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 7, Jul 85  
(manuscript received 13 Mar 85) pp 669-695

MARTINEK, K., LEVASHOV, A. V., KLYACHKO, N. L., Moscow State University  
imeni M. V. Lomonosov; KHMEL'NITSKIY, Yu. L. and BEREZIN, I. V.,  
Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] In nature, enzymes function primarily in complex ensembles involving lipids, proteins, polysaccharides and other molecular components in solutions in which water is not the only dominant component. Enzyme catalysis therefore occurs in a microheterogeneous medium in which water acts as a regulator, determining the supermolecular structure of the catalytic reactor. Possible experimental methods of modeling the enzyme functions under such conditions are discussed, with particular attention given to such systems as proteolipid complexes and enzymes in organic solvents solubilized with phospholipids or detergents. The tasks of micellar enzymology are formulated and its relationship to membranology is discussed. The tasks include the study of the catalytic properties of solubilized enzymes as a function of degree of hydration; use of natural lipids as micelle-forming components, allowing study of the mechanisms of regulation of lipid-dependent enzymes; study of the interaction of enzymes in substrates insoluble in water; investigation of the dynamics of enzyme processes under conditions such that the substrate is distributed between water and organic solvents; study of cryoenzymatic processes occurring below the freezing point of water; and modeling of elementary biomembrane structure fragments with hydrated associations of protein and amphiphilic compound molecules. The new capabilities of enzymology allow the use of colloidal aqueous solutions in organic solvents as microheterogeneous media for enzyme reactions. Figures 14; references 323: 120 Russian, 203 Western.  
[2064-6508/5915]

UDC 579.842.23:577.112'314.6

STUDY OF YERSININ, THE PRIMARY POLYPEPTIDE OF THE EXTERNAL MEMBRANE OF  
YERSINIA PSEUDOTUBERCULOSIS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 7, Jul 85  
(manuscript received 25 Oct 84) pp 714-724

NOVIKOVA, O. D., ZYKOVA, T. A., YADYKINA, G. M., GLAZUNOV, V. P.,  
SOLOV'YEVA, T. F., and OVODOV, Yu. S., Pacific Ocean Institute of Bioorganic  
Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] The protein composition was studied of a lipopolysaccharide-protein complex extracted from the outer membrane of the pseudotuberculosis microbe *Yersinia pseudotuberculosis* in trichloroacetic acid and n-butanol. The major protein component of this complex is a polypeptide with molecular weight 40 kDa, which the authors have named yersinin. This article describes continued purification of yersinin, strain 2602 isolated from the urine of a patient with Far-Eastern scarletina-like fever. The yersinin was purified from the accompanying 20% lipopolysaccharide by ion-exchange chromatography, gel chromatography in the presence of sodium dodecylsulphate at 37°C and hydrophobic chromatography in polytetrafluoroethylene. Isoelectrofocusing produced a homogeneous protein preparation with pI 5.9. The N-terminal amino acid sequence of yersinin was found to be Ala-Glu-Ile-Tyr-Asn-Lys-Asp-Gly-Asn-Lys-Leu-Asp-Leu-Tyr-. The physical-chemical characteristics and amino acid composition of the protein are similar to those of other enterobacteria.

Figures 7; references 21: 7 Russian, 14 Western.

[2064-6508/5915]

UDC 577.152.3

ISOLATION AND SOME PROPERTIES OF  $\alpha$ -GALACTOSIDASE AND  $\beta$ -N-ACETYLGLUCOSAMINIDASE  
OF CEPHALOSPORIUM ACREMONIUM 237 MICROMYCETE

Moscow BIOKHIMIYA in Russian Vol 50, No 6, Jun 85  
(manuscript received 14 Sep 84) pp 949-954

ZAPROMETOVA, O. M., ABDYGAPPAROV, A. S., VLEZLO, I. V. and BEZBORODOV, A. M.,  
Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] Hydrolytic enzymes of microorganisms such as  $\alpha$ -galactosidase (I) and  $\beta$ -N-acetylglucosaminidase (II) are important agents because of their use as highly specific reagents for structure determinations of complex biopolymers. Abroad, I is produced from coffee beans. The goal of this study was to obtain domestically [in USSR] purified preparations of I and II from microorganisms such as *Ceph. acremonium* 237. Based on the gel-filtration method, the enzymes isolated in this work had molecular weight 240 K and 290 K respectively and exhibited similar properties. Isoelectric points of both products was 4.96. To separate these two proteins, selective sorption on

hydroxyapatite was used in 0.02 M sodium-phosphate buffer, at pH 7.0. The activity of Purified I was inhibited by  $\text{Ag}^+$ ,  $\text{Mg}^{++}$ ,  $\text{Fe}^{++}$ ,  $\text{Zn}^{++}$  and  $\text{Hg}^{++}$ , while that of II was practically uninhibited, except by  $\text{Fe}^{++}$  ions. I is also more sensitive to sugars than II. Figures 4; references 13: 6 Russian, 7 Western. [2067-7813/5915]

UDC 577.15.02+577.152.9

#### ISOLATION AND PROPERTIES OF IMMOBILIZED PROSTAGLANDINSYNTHETASE PREPARATIONS

Moscow BIORHIMIYA in Russian Vol 50, No 6, Jun 85  
(manuscript received 10 Oct 84) pp 974-979

MEVKH, A. T., SUD'INA, G. F., YAKUSHEVA, L. A., MYAGKOVA, G. I. and YEVSTIGNEYEVA, R. P., Moscow State University imeni M. V. Lomonosov; Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov

[Abstract] Prostaglandins (PG) are biologically-active compounds, intracellular regulators of many physiological processes and possible drugs for human and animal application. The goal of this study was to develop immobilization methods of PG-synthetase and to evaluate properties of the immobilized enzyme complex. Three methods were used for immobilization: covalent grafting on the carrier, inclusion into the polyacrylamide gel matrix and adsorption on ion exchange resins. The last method was optimal. Microsomal preparation of PG-synthetase immobilized on DEAE-sephadex was considerably more stable than the material suspended in a buffer solution (40% activity retained by the immobilized PG-synthetase after 24 hrs versus total loss of activity of the suspended material after only 7 hrs.). DEAE-sephadex carrier did not lead to intradifusional limitations and its kinetic function was of the Michaelis type. DEAE-Toepel 650 M was an excellent carrier for reversible immobilization of PG-synthetase. Figures 9; references 10: 5 Russian, 5 Western. [2067-7813/5915]

SPECTRAL AND CATALYTIC PROPERTIES OF METHANOLDEHYDROGENASE FROM METHANE OXIDIZING BACTERIA *METHYLOCOCCUS CAPSULATUS*, STRAIN M.

Moscow BIOKHIMIYA in Russian Vol 50, No 6, Jun 85  
 (manuscript received 15 Oct 84) pp 980-985

VOLOSHINA, Ye. S., GVOZDEV, R. I., GRIGORYAN, A. N., MALASHENKO, Yu. R.  
 and BARATOVA, L. A., Division of the Institute of Chemical Physics, USSR  
 Academy of Sciences, Chernogolovka, Moscow Oblast; All-Union Scientific Research  
 Institute of Protein Synthesis, Moscow; Institute of Microbiology and Virology,  
 Kiev; Moscow State University imeni M. V. Lomonosov, Moscow

[Abstract] Methanoldehydrogenase (MD) is a key enzyme in a series of methanol oxidizing bacteria and yeasts. MD is also found in methane oxidizing bacteria but this enzyme has not been studied well. Therefore, its spectral and catalytic properties as well as the aminoacid composition were studied. MD was isolated from *Methylococcus capsulatus* bacteria. The absorption spectrum of MD showed peaks at 225, 280 and 345 nm with a shoulder at 410 nm. The EPR spectrum at 293 K showed a narrow line 6.25 E, with the g factor of 2.002,--a typical spectrum of semiquinones. MD appeared to have a rigid structure with a large number of spiral fragments. Aminoacid composition of MD was reported. Optimal pH of its enzymatic activity is 9.5. MD does not oxidize methanol without electron acceptors. Addition of cytochrome C binding CO to MD isolated under anaerobic conditions, stimulated its activity in presence of phenazine-methosulphate 2-3 fold. Activity of MD obtained in air is not stimulated.  
 Figures 5; references 15: 2 Russian, 13 Western.  
 [2067-7813/5915]

## PURIFICATION OF ASIALOGLYCOPROTEIN RECEPTORS FROM MURINE LIVER AND SOME OF THEIR PROPERTIES

Moscow BIOKHIMIYA in Russian Vol 50, No 6, Jun 85  
 (manuscript received 19 Oct 84) pp 992-997

BYSTROVA, N. K. and BELEN'KIY, D. M., Institute of Biological and Medical Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] Asialoglycoprotein receptor is an important component of plasmatic hepatocytic membrane, being responsible for the clearance of desialated glycoproteins in blood serum, the result of which is their entering into parenchymal liver cells. The functioning details of asialoglycoprotein receptors make it possible to use it in clinical aspects as a highly specific instrument for the supply of various therapeutic reagents into parenchymal cells of the liver. The goal of this study was to isolate, purify and characterize the receptors from the mouse liver. It was indeed possible to isolate these receptors by means of biospecific chromatography on sepharose-asialo-orosomucoid and to purify it adequately. The receptor binds to the non-reducing terminal galactosyl residues of glycoproteins which resemble the

receptors from other mammalian livers. Calcium was found to be required for the interaction of this receptor with desialylated glycoproteins. Analogously to the asialoorosomucoid, the receptor was found to bind the p-aminophenyl- $\beta$ -D-galactopyranoside derivatives of bovine serum albumin and acid  $\alpha$ -glucosidase. This type of an agent could be used as a therapeutic drug for the II-type glycogenosis--a disease characterized by accumulation of glycogen in liposomes. Figures 3; references 24: 3 Russian, 21 Western. [2067-7813/5915]

UDC 577.152.2

KINETIC PROPERTIES OF DIOXYACETONEKINASE OF METHYLOTROPIC YEASTS CANDIDA BOIDINII KDI

Moscow BIORHIMIYA in Russian Vol 50, No 6, Jun 85  
(manuscript received 20 Nov 84) pp 1012-1017

BYSTRYKH, L. V., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Dioxyacetonekinase (I) was isolated from the yeasts *Candida methylica* and *Candida boidinii*; it plays an important role in regulating the metabolism of methanol. The goal of this study was to evaluate in more detail the kinetic properties of I. It was shown that this enzyme does not fit the Michaelis-Menten kinetics. The reaction appears to be inhibited by excessive concentration of ATP or  $Mg^{++}$ . The optimal concentration ratio of  $Mg^{++}$  to ATP was found not to be constant; it depended on the concentration of the reagents.

At optimal concentrations of  $Mg^{++}/ATP$ , the  $v$  expressed as a function of  $[Mg-ATP]$  was almost hyperbolic. Based on the experimental data, a model was developed in which the changes in the substrate concentration and enzyme inhibitors were taken into consideration. This comparative analysis of kinetic properties of dioxyacetonekinase could be used to verify adequateness of model characteristics for evaluation of the kinetics constants and for development of new models for the action of enzymes with complex kinetic properties. Figures 7; references 11: 2 Russian; 9 Western (1 by Russian authors). [2067-7813/5915]

UDC 577.152.277+577.112.7

ADP RIBOSYLATION OF HISTONES AND NAD-PYROPHOSPHORYLASE ACTIVITY OF CHICKEN LIVER NUCLEI DURING INDUCTION OF DNA DAMAGES

Moscow BIORHIMIYA in Russian Vol 50, No 5, May 85  
(manuscript received 12 Oct 84) pp 844-848

KHALMURADOV, A. G. and MULYAVKO, N. A., Institute of Biochemistry imeni A. V. Palladin, UkrSSR Academy of Sciences, Kiev

[Abstract] The goal of this study was to establish the relationship between increased activity of poly(ADPR)-polymerase, the degree of ADP-ribolysation of histones and the activity of the key enzyme in biosynthesis of  $\text{NAD}^+$ — $\text{NAD}$ -pyrophosphorylase during induction of DNA damages using pancreatic DNAase I and N-methyl-N-nitrosourea (I). This process was studied by the rate of  $^{14}\text{C}$  $\text{NAD}$  incorporation into chicken liver nuclear histones. Treatment of the nuclei with DNAase I gave about a 50% damage of DNA. Treatment with I showed hardly any damage of the DNA. Poly(ADPR) polymerase activity in both cases of DNA damage increased in comparison to controls. NAD-pyrophosphorylase activity reached a maximum in DNA-ase damaged chicken liver at the 20-35% level; in case of I treatment, the NAD-pyrophosphorylase activity did not differ from the controls. An assumption was made that participation of NAD-dependent ADP-ribolysation during DNA repair processes is expressed by increased modification of histone proteins and depends on the activity of NAD-NAD-pyrophosphorylase enzyme. Figures 5; references 17: 4 Russian, 13 Western.

[2066-7813/5915]

UDC 577.152.1

KINETIC PROPERTIES AND THERMOINACTIVATION OF BACTERIAL URICASE

Moscow BIORHIMIYA in Russian Vol 50, No 5, May 85  
(manuscript received 6 Aug 84) pp 782-785

SIMONYAN, A. L., TATIKYAN, S. Sh. and KULIS, Yu. Yu., Yerevan Institute of Physics; Institute of Biochemistry, LiSSR Academy of Sciences, Vilnius

[Abstract] Uricases are enzymes responsible for oxidation of uric acid with molecular oxygen. Isolated from various sources, they may differ considerably from each other in pH, molecular weight, isoelectric point,  $K_m$ , etc. They find application in medical and analytical fields. In the present work, kinetics of action and thermal inactivation of uricase obtained from *Bac. fastidians* was studied. Thermal inactivation of uricase is a first order process up to 80-90% conversion; inactivation rate constant decreased when pH was raised from 7.5 to 9.3. When the incubation medium was saturated with air oxygen, the initial rate expressed as a function of the concentration of uric acid was well within the Lineweaver-Burk coordinates; initial velocity as a function of oxygen concentration at a fixed value of uric acid, however, was

not linear. An assumption was expressed that the oxygen-enzyme interaction is cooperative and, depending on the method, Hill's coefficient of cooperativeness was found to be 2.6 or 2.8. Figures 5; references 11: 3 Russian, (1 by Western author), 8 Western.  
[2066-7813/5915]

UDC 577.352.4

EFFECT OF CALMODULIN ANTAGONISTS ON MEMBRANE POTENTIAL, POTASSIUM PERMEABILITY AND MITOGENICITY OF LYMPHOCYTES

Moscow BIOKHIMIYA in Russian Vol 50, No 5, May 85  
(manuscript received 15 Oct 84) pp 786-794

GUKOVSKAYA, A. S., ZINCHENKO, V. P. and ASTASHKIN, Ye. I., Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; Scientific Research Institute of Biological Evaluation of Chemical Compounds, Kupavna, Moscow Oblast

[Abstract] Effect of phenothiazine type calmodulin antagonists (trifluoroperazine and chloropromazine) on mitogenesis, membrane potential and potassium permeability of lymphocytes in peripheral human blood (LPB) and of rat thymocytes at rest and under the influence of  $\text{Ca}^{++}$ -ionophore A23187 was investigated. It was shown that phenothiazine caused depolarization of thymocytes and LPB; this effect diminished in presence of  $\text{Na}^+/\text{H}^+$  exchange inhibitors and in media low in  $\text{Na}^+$ . It was not caused by inhibition of  $\text{Na}^+-\text{K}^+$  pump or by decreased permeability of  $\text{K}^+$  through the membrane. An assumption was made on the basis of experimental data that calmodulin contributed to the maintenance of low level of sodium permeability through the membrane of resting lymphocytes. However, calmodulin did not necessarily represent the only mechanism of the function of phenothiazines in the cell. In general, calmodulin antagonists appeared to inhibit mitogen induced activation of lymphocytes. Figures 8; references 30: 9 Russian, 21 Western (1 by Russian authors).  
[2066-7813/5915]

UDC 577.175.853'17.012.6:543.422.25

DETERMINATION OF CONFORMATION OF CYCLIC ANALOG OF BRADYKININ BY TWO-DIMENSIONAL  $^1\text{H-NMR}$

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 8, Aug 85  
(manuscript received 29 Jan 85) pp 1013-1025

SAULITIS, Yu. B., LIYEPINSH, E. E., SEKATSIS, I. P., SHENDEROVICH, M. D., MUTULIS, F. K., MUTULE, I. E. and CHIPENS, G. I., Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga

[Abstract] COSY and NOESY spectra of 2D  $^1\text{H-NMR}$  provided the basis for an analysis of the conformational characteristics of a cyclic analog of bradykinin --[cyclo(9 $\rightarrow$ 1 $\epsilon$ ), Lys<sup>1</sup>, Gly<sup>6</sup>]bradykinin (CBK)--in  $(\text{CD}_3)_2\text{SO}$  and in  $\text{H}_2\text{O}$ . Two, slowly

interconverting, forms of CBK existed in  $(CD_3)_2SO$ , with the concentration of the minor component not exceeding 15%. The minor component was absent in  $H_2O$ ; in addition the chemical shifts of the NH and  $C^\alpha H$  protons differed insignificantly for CBK and bradykinin. In  $(CD_3)_2SO$ , the major CBK structural component contains at least two X-Pro fragments with trans-amide groups and three amide protons belonging to Phe<sup>5</sup>, Arg<sup>9</sup> and Lys<sup>1</sup> that are shielded from the solvent. Analysis of the cross-peaks and maximal distances between the backbone protons of adjacent amino acid moieties provided good agreement with hypothesized type II  $\beta$ -fold in the Pro<sup>2</sup>-Pro<sup>3</sup>-Gly<sup>4</sup>-Phe<sup>5</sup> sequence. In addition, a spatial model is advanced for the amino acid 6-9 sequence of CBK, which incorporates two intramolecular hydrogen bonds that involve the protons of the Arg<sup>9</sup> and Lys<sup>1</sup> NH groups and the carbonyl groups of Phe<sup>5</sup> and Gly<sup>6</sup>. Figures 7; references 39: 7 Russian, 32 Western.  
[034-12172/5915]

UDC 578.832.1.A:578.22:577.112.6

SYNTHESIS OF HEMAGGLUTININ PEPTIDE FRAGMENTS OF INFLUENZA VIRUS  
A/Aichi/2/68 (H3N2)

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 8, Aug 85  
(manuscript received 8 Jan 85) pp 1037-1047

SAMUKOV, V. V., KALASHNIKOV, V. V., OFITSEROV, V. I. and SHVAL'YE, A. F.,  
All-Union Scientific Research Institute of Molecular Biology,  
Kol'tsovo Settlement, Novosibirsk Oblast

[Abstract] Standard techniques of peptide synthesis were employed for the synthesis of selected amino acid sequences of influenza virus A/Aichi/2/68 (H3N2) hemagglutinin, in order to prepare antigenic determinants for potential use in immunization. The sequences synthesized corresponded almost entirely to determinant A (amino acid sequences 122-133 and 136-147) and determinant B (154-164). The method of synthesis relied on stepwise growth of the peptide chains using ester-activated Boc amino acids and condensation reactions, with the C-terminal groups protected by Pse-OH (2-[4-(phenylazo)benzylsulfonyl]) ethanol) and the N-terminal groups by the Boc group. The resultant peptides were purified by reversed-flow liquid chromatography and conjugated to bovine serum albumin. The conjugates are presently undergoing evaluation for immunogenicity and antigenic specificity. Figures 2; references 22: 4 Russian, 18 Western.  
[034-12172/5915]

UDC 577.113.6:547.963.32.057:542(953+973)

RAPID SYNTHESIS OF OLIGODEOXYRIBONUCLEOTIDES BY PHOSPHOTRIESTER METHOD WITH NUCLEOPHILIC OXYGEN CATALYSTS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 8, Aug 85  
(manuscript received 11 Feb 85) pp 1087-1096

YEFIMOV, V. A. and CHAKHMAKHCHEVA, O. G., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Further refinements were conducted on the phosphotriester method for the synthesis of oligodeoxyribonucleotides, which accelerated several-fold the rate of synthesis both in solution and on polymeric supports. The condensing reagents for the creation of internucleotide bonds consisted of arylsulfonyl chlorides and their derivatives, with catalysis provided by nucleophilic oxygen compounds consisting of the N-oxides of pyridine and quinoline. The latter also had the advantage of limiting the number of side reactions. The use of the O-nucleophilic catalysts reduced the duration of one synthetic cycle to 10 min, with internucleotide condensations completed in 2-5 min with practically quantitative yields. Specific details are provided on the synthesis of several deoxyribonucleotides 13 to 20 nucleotides long. Figures 4; references 15: 1 Russian, 14 Western.

[034-12172/5915]

UDC 577.114.5:582.273

ALGAL POLYSACCHARIDES. PART 36. COMPOSITION AND PROPERTIES OF AGAR FROM FAR EASTERN GRACILARIA SP.

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(manuscript received 8 Feb 85) pp 1119-1124

USOV, A. I., IVANOVA, Ye. G. and PRZHEMENETSKAYA, V. F., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow; Pacific Ocean Scientific Research Institute of Fisheries and Oceanography, Vladivostok

[Abstract] A species of *Gracilaria* similar to the standard agar producer *G. verrucosa* was isolated in Bay of Amur in the Sea of Japan, which differed from *G. verrucosa* by a significantly higher growth rate under laboratory conditions. In view of this, studies were conducted to determine whether the new isolate could serve as a source of agar. Both the tetrasporophyta and the carposporophyta generations produced agar, with that synthesized by the former showing higher gel activity than that produced by carposporophyta. However, the carposporophyta produced agar in higher yields. The gel strength of both agars was improved by alkali treatment. Although the overall agar yield was less than that obtained with *G. verrucosa*, the higher growth rate of the new isolate makes it a potentially promising source of agar. Figures 2; references 14: 6 Russian, 8 Western.

[034-12172/5915]

REGIO- AND STEREOSPECIFIC SYNTHESIS OF NOVEL-TYPE BOND POLYGLUCOSE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 8, Aug 85  
(manuscript received 29 Dec 84; in final form 11 Mar 85) pp 1125-1129

BERMAN, Ye. L., GORKOVENKO, A. A., ZUBOV\*, V. P. and PONOMARENKO, V. A.,  
Institute of Organic Chemistry imeni N. D. Zelinskiy; \*Institute of Bioorganic  
Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Synthesis was conducted on a polyglucose with a novel chair-type  
 $^1C_4$  bond, the first representative molecule of (2-3)-linked polymers. The  
(2-3)-4-O-methyl-1,6-anhydro- $\beta$ -D-glucopyranose (I) was prepared by anionic  
polymerization of 1,6;2,3-dianhydro-4-O-methyl- $\beta$ -D-mannopyranose by butyl-  
cellosolvolate in tetrahydrofuran. The regio- and stereospecificity

was confirmed by  $^{13}C$  NMR spectroscopy. I was obtained in a 98% yield by the  
technique employed, and represents a novel nonhydrolyzable linear polymer.  
Figures 1; references 13: 5 Russian, 8 Western.

[034-12172/5915]

UDC 617.741-004+617.741-07-092.9

FLUORESCENT-POLARIZATION PROPERTIES OF CHROMOPHORES OF WATER-SOLUBLE PROTEINS OF NORMAL AND CATARACTAL HUMAN LENS

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 29, No 8, Aug 85  
(manuscript received 2 Oct 84) pp 757-759

[Article by T. V. Birich, corresponding member BSSR Academy of Sciences, N. I. Poznyak, N. A. Prokoshina and S. N. Cherenkevich, Minsk Medical Institute, Belorussian State University imeni Lenin]

[Text] The spectral fluorescent properties including the fluorescence lifetime and polarization of water-soluble cortex and nucleus proteins are found to be different in normal and cataractal human lenses. The origin of chromophores which are emitted in the visible spectral range and the modification of protein structure are associated with the formation of intra- and intermolecular covalent bonds in proteins.

It has now been established that alterations in the structural and functional states of the proteins of the lens are largely responsible for the change in optical properties of the lens of the human eye with age and in the development of cataract [1,2]. Photomodification of amino acid radicals, formation of cross links between the protein molecules and changes in the functioning of the protective antioxidative systems of the eye lead to a clouding of the lens and a change in its color, and the proteins become able to fluoresce in the near ultraviolet and visible spectra [3-5]. However insufficient study has been given to the physicochemical properties, age features and alterations in the proteins of the lens under the action of light.

The present work studied the fluorescent properties, including the lifetime of the excited state of the molecules and the degree of polarization of fluorescence ( $\tau$  and  $P$ ) of the water-soluble proteins of the normal and cataractal human lens cortex and nucleus. The normal lenses were taken from enucleated eyes of sudden-death victims ranging from 40-66 years, no later than 5-7 h after death. The cataractal lenses were obtained during operations at an eye disease clinic and for the most part were represented by cortical-nuclear opacities. We studied the water-soluble fraction of the proteins of the lens cortex and nucleus obtained after homogenization in physiological solution and subsequent centrifuging at 6000 g for 20 min. All the studies were done at room temperature.

The fluorescence spectra of the proteins in tris-HCl, pH 7.4, buffer, were registered on the Fica-55M spectrofluorimeter. The lifetime of the excited state of the molecules and the degree of polarization of the fluorescence were measured with the SLM spectrofluorimeter. In determining the lifetime of the excited states of the molecules the relation between the intensity of fluorescence and the time with pulsed excitation was regarded as a single-exponent function. The water solutions of the proteins were irradiated by the DSKSh-1000 tube, using an interference filter (transmission band  $279 \pm 8$  nm) or the filter UFS-8 (transmission band 300-400 nm).

The fluorescence spectra of the water-soluble proteins of both the cortex and nucleus of the lens are characterized by two bands [4,5]. We established that the band in the ultraviolet region of the spectrum (depending on the source of the preparation) has a maximum at 330-334 nm and a half-width of 59-64 nm. The position of the maxima of the fluorescence spectra of the proteins in the visible region depends not only on the source of the preparation, but also the wavelength of the excitation. When the proteins of normal lenses are excited in the region of 320-340 nm, the maximum of the fluorescence spectrum is usually in the region 410-460 nm, while the half-width is more than 100 nm. Cataractal proteins are characterized by a lesser intensity of fluorescence in the ultraviolet and a higher intensity in the visible regions of the spectrum. These preparations also display an emission in the region 500-520 nm when excited by light of wavelength larger than 390 nm.

Irradiation of the proteins of the normal lens cortex and nucleus by light of  $\lambda = 279$  nm as well as light in the region 300-400 nm is accompanied by a drop in intensity of the emission in the ultraviolet and rise in intensity of fluorescence in the visible spectrum. This fact testifies that the formation of protein components that fluoresce in the visible region of the spectrum is the result of photolysis of the tryptophanyl of the proteins. The characteristics of the fluorescence spectra in the visible region indicate at least two types of fluorescing products contribute to these spectra.

The table presents the results of measuring the lifetime of the excited state and the degree of polarization of the fluorescence of the chromophores responsible for the emission of the lens proteins in the ultraviolet and visible regions of the spectrum. The lifetime and degree of polarization for the chromophores of all protein preparations in the ultraviolet region are equal to 3.0-3.2 ns and 0.22-0.24, respectively. Such values of the parameters  $\tau$  and  $P$  are characteristic of tryptophanyl radicals in proteins [6].

While  $P$  of the fluorescence of proteins in the visible region is 0.28-0.29 for the normal lens, this value is respectively equal to 0.34 and 0.36 for the proteins of the cortex and nucleus of the cataractal lens;  $\tau$  of the chromophores fluorescing in the visible region is 5.5-5.6 ns for normal proteins, 5.9-6.4 ns for cataractal proteins. We should point out that model experiments irradiating the water-soluble proteins of the lens of healthy

Lifetime of molecules in the excited state ( $\tau$ ) and degree of polarization (P) of the fluorescence of water-soluble proteins of the human lens

Lens	$\lambda_{exc} = 296$ nm	$\lambda_{exc} = 340$ nm		
	$\lambda_{reg} = 332$ nm	$\lambda_{reg} = 420$ nm		
τ, ns				
	P	τ, ns	P	
Normal				
cortex	3.2±0.1	0.23±0.01	5.6±0.1	0.28±0.01
nucleus	3.2±0.1	0.24±0.01	5.5±0.1	0.29±0.01
Cataract				
cortex	3.2±0.2	0.22±0.01	5.9±0.3	0.34±0.01
nucleus	3.0±0.2	0.24±0.01	6.4±0.3	0.36±0.01

persons have achieved parameters that virtually coincide with the spectral characteristics of the water-soluble proteins of cataractal lenses.

Comparison of the findings on the fluorescent properties of the protein chromophores with literature data on fluorescence of tryptophan and tyrosine photolysis products [7] suggests that kynurenine-like products and dityrosine may be responsible for the fluorescence of the lens proteins in the visible spectrum. We had previously established [8] that, in the case of cataract and exposure to UV and visible light, changes occur in the position and form of the absorption and fluorescence spectra for protein preparations similar to those under investigation, and the aggregation ability of the proteins is also intensified. These data and the data from the present work indicate that the accumulation of photolysis products--radicals of aromatic amino acids in the case of cataract--is accompanied by modification of the structural state of the molecules of the lens proteins.

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12717  
CSO: 1840/2037

MODEL OF COOPERATIVE ALTERATIONS IN BIOLOGICAL MEMBRANES WITHOUT CONSEQUENCE FOR RECEPTOR AFFINITY

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(manuscript received 9 Apr 84; in final form 17 Jul 84) pp 431-435

KALER, G., Institute of Photobiology, Belorussian SSR Academy of Sciences, Minsk

[Abstract] The Hill equation for cooperative phenomena in ligand binding was expanded to include intermediate states of ligand binding site (or eceptor) interaction, i.e., transitional states, rather than the initial (free or unbound) and final (bound or occupied) states. The treatment was then applied to ligand interaction with membrane receptors, the structural consequences of which result in a sigmoid dependence of some membrane parameter on the ligand. The receptors of the membrane are treated as N-valent entities which undergo a structural rearrangement when  $n$  binding sites are occupied ( $n < N$ ). The model demonstrates that a sigmoid-shaped relationship between a structurally-sensitive membranous parameter and the ligand can prevail even in the absence of positive cooperativity, i.e., when the affinity of the receptors for the ligand is not increased as a result of ligand binding. Figures 3; references 11: 9 Russian, 2 Western.

[2090-12172/5915]

EFFECTS OF CHOLESTEROL ON STABILITY OF HUMAN ERYTHROCYTE MEMBRANE TO ELECTRICAL BREAKDOWN

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(manuscript received 27 Oct 84; in final form 26 Jul 84) pp 441-445

GONCHARENKO, M. S. and KATKOV, I. I., Kharkov Scientific Research Institute of Dermatology and Venerology

[Abstract] Comparative studies were conducted on the breakdown voltage of pulsed electrical fields of normal human erythrocytes, erythrocytes obtained from patients with psoriasis with known elevated cholesterol levels of the erythrocyte membrane, and human erythrocytes with artificially-elevated membrane concentrations of cholesterol induced by incubation with cholesterol-rich liposomes. The latter technique involved liposomes prepared from phospholipids isolated from human erythrocyte membranes in order to avoid changing the phospholipid or fatty acid composition of the erythrocyte membranes. Using field

strengths in the 1.4 to 3.2 kV/cm range showed that 50% lysis of the normal control erythrocytes was obtained with a potential of ca. 1.9 kV/cm, and approximately 2.2 kV/cm in the case of cells from psoriatic patients and erythrocytes incubated with high-cholesterol liposomes (3.6 mg/mg lecithin + 2.4 mg/ml cephalin + 4.0 mg/ml cholesterol). The data thus demonstrated a direct correlation between increased electromechanical stability of human erythrocyte membranes and their cholesterol levels, and suggest that determination of breakdown voltage may be a promising method of assessing such characteristics. Figures 3; references 17: 11 Russian, 6 Western.  
[2090-12172/5915]

PERMEABILITY OF E. COLI CYTOPLASMIC MEMBRANE TO THIOUREA,  
DIMETHYLSULFOXIDE AND GLYCEROL

Moscow BIOFIZIKA in Russian Vol 30, No 3, May-Jun 85  
(manuscript received 17 Apr 84) pp 446-449

YEFIMOV, V. B. and SHARONOV, B. P., All-Union Scientific Research Institute of Highly Purified Biopreparations, Leningrad

[Abstract] The osmotic shock technique was used in a study on the permeability of E. coli cytoplasmic membrane to thiourea, dimethylsulfoxide and glycerol, the latter used in a concentration range of 0.1 to 1.0 M. Influx of these non-electrolytes into the cell proceeds by nonspecific diffusion characterized by first order kinetics. Determinations of time constants ( $\tau$ ) for the diffusion processes showed that in terms of increasing  $\tau$  values the substances ranked as follows: dimethylsulfoxide > thiourea > glycerol. In addition,  $\tau$  was directly related to the concentration of the test substance. The fact that  $\tau$  increased with an increase in the concentration of these compounds indicates that they modified the cytoplasmic membrane in a dose-dependent fashion to promote permeability. Figures 2; references 13: 2 Russian, 11 Western.  
[2090-12172/5915]

DETERMINATION OF DYNAMIC CELL LOSS MODULUS FROM ULTRASOUND ATTENUATION OF E. COLI SUSPENSION

Moscow BIOFIZIKA in Russian Vol 30, No 3, May-Jun 85  
(manuscript received 7 Jul 83; in final form 22 Mar 84) pp 460-463

KOL'TSOVA, Ye. S., MIKHAYLOV, I. G., VINOGRADOV, Ye. L. and BEZLADNOV, S. N., All-Union Scientific Research Institute of Highly Purified Biopreparations, Leningrad

[Abstract] An ultrasound method was devised for assessment of the mechanical characteristics of bacterial cells, which bypasses the need for special pre-treatment of the cells. Trial studies were conducted with E. coli M-17 suspensions in 0.8% NaCl with determination of the coefficient of ultrasound attenuation ( $\alpha$ ) at  $2 \times 10^5$  to  $7 \times 10^8$  Hz frequencies. With cell concentrations in the 0.1 to 1.1% (v/v) range, loss of acoustic energy was an additive

factor expressed by  $\Delta\alpha = \alpha_s + \alpha_n + \alpha_T + \alpha_r$ , where  $\alpha_s$  represents loss due to light scattering by the particles (cells),  $\alpha_n$  that due to viscosity factors,  $\alpha_T$  that due to heat exchange between cells and dispersion medium, and  $\alpha_r$  that due to energy absorption by the particles. However, since  $\alpha_s$ ,  $\alpha_n$  and  $\alpha_T$  were negligible, the relationship  $\Delta\alpha = \alpha_r$  prevailed. Determination of the cell loss modulus (K) showed that K increased from  $1.2 \times 10^7$  to  $1.8 \times 10^8$  Pa in changing the frequency from  $2 \times 10^5$  to  $7 \times 10^8$  Hz. In terms of the order of magnitude the values of K were in agreement with those previously reported for synthetic polymers, and also agreed with determinations made for bovine serum albumin. The latter forms compact aggregates 0.3  $\mu\text{m}$  in size, comparable with *E. coli* cell size, suggesting that cell wall structures determine the value of K. Figures 2; references 10: 8 Russian, 2 Western.

[2090-12172/5915]

#### POLYMER GELS CONTAINING COVALENT BONDED ZINC PHTHALOCYANINE AS MODELS OF LIGHT-COLLECTING SYSTEMS IN PHOTOSYNTHESIS

Moscow BIOFIZIKA in Russian Vol 30, No 4, Jul-Aug 85  
(manuscript received 3 Aug 84) pp 593-597

PSHEZHETSKY, V. S., LEBEDEVA, T. S., YAROSLAVOV, A. A., LUKYANETS, Ye. A. and GALPERN, M. G., Moscow State University imeni M. V. Lomonosov; Scientific Research Institute of Organic Products and Dyes, Moscow

[Abstract] A light-collecting antenna with a high concentration of monomer pigment, which swells in polar solvents and has the stability of properties in the swollen state required for effective photosynthesis, can be created on the basis of pigments which are covalent bonded with a cross-linked polymer matrix. This work uses poly-4-vinylpyridine (I) and polyethyleneimine (II) as polymer matrices, with zinc tetrachloromethyl phthalocyanine (III) introduced in an alkylation reaction. Additional cross-linking was performed by 1,3-dibromo-propane (IV), all reactions performed in dimethylformamide (V). The pigment in the gels produced is primarily associated, as indicated by the absorption spectra of the gels. The studies showed that (I) is not suitable as a matrix for covalent bonding of (III). Considering that the final goal of the study was to produce a fluorescing polymer system retaining its properties in polar solvents, particularly water, it is concluded that a flexible-chain water-soluble polymer without large hydrophobic substituents and capable of easily entering the reaction of alkylation should be used as the macromolecular base of the gel. Polymers constructed on the basis of amines with short hydrocarbon fragments such as polyethyleneimine and polyvinylamine are suitable.

Figures 4; references 4: 3 Russian, 1 Western.  
[2092-6508/5915]

STUDY OF REGULATION OF POTENTIAL-DEPENDENT CHANNELS BY RAMAN SPECTROSCOPY

Moscow BIOFIZIKA in Russian Vol 30, No 4, Jul-Aug 85  
(manuscript received 9 Jan 85) pp 620-624

MAKSIMOV, G. V., CHURIN, A. A., PASHCHENKO, V. Z. and RUBIN, A. B.,  
Biology Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] An extensive search is currently underway for the molecular analog of potential sensors in excitable membranes. The purpose of this work is to study the possibility that carotenoid molecules in the lipid phase of the membrane play the role of potential sensor agents and to study the presence of a regulatory connection between conformation and surface potential. Studies were performed on an isolated frog sciatic nerve in a special chamber allowing simultaneous recording of Raman spectra and nerve action potential. The nerves were stimulated by rectangular current pulses at 100 pulses per second, pulse length 0.1 ms, amplitude 450-500 mV. Stimulation caused a variation in the ratio of intensities of Raman spectral lines indicating compression of the polyene chain of the carotenoid molecule with the methyl radicals approaching the longitudinal axis of the molecule. When tetrodotoxin, a sodium channel blocker, was used, the carotenoid molecules were still compressed. Desorption of surface  $\text{Ca}^{2+}$  ions resulted in a decrease intensity of the bands and an increase in the  $I_{1526}/I_{1160}$  ratio, thus almost completely modeling changes in the Raman spectrum of the carotenoids observed upon rhythmic excitation. A diagram of operation of the potential-dependent sodium channel is presented, assuming that the carotenoid molecule plays the role of potential sensor. Figures 4; references 5: 3 Russian, 2 Western.  
[2092-6508/5915]

UDC 577.3

STABILITY OF MOUSE LIVER CELL MEMBRANE POTENTIAL TO DAMAGING EFFECTS

Moscow BIOFIZIKA in Russian Vol 30, No 4, Jul-Aug 85  
(manuscript received 2 Jul 82) pp 646-649

RADKEVICH, L. A., KOLOTYGINA, I. M. and KABAKOV, A. Yu., Scientific Research Institute of Biological Testing of Chemical Compounds, Kupavna (Moscow Oblast)

[Abstract] It has been previously shown that the membrane potential of liver cells undergoes characteristic changes in ischemia and under certain influences. In this article, the authors attempted to use the criterion of stability of electogenesis of liver tissue to standard effects *in vitro* to estimate the functional status of the tissue under certain experimental influences *in vivo*. The membrane potential of liver cells was measured using a standard method with glass microelectrodes filled with 3M KCl and a high impedance type ED- 05M recording device. Special experimental effects *in vivo* included stimulation of proliferation by partial hepatectomy; poisoning with  $\text{CCl}_4$  by 1-time administration of 0.1 ml 40%  $\text{CCl}_4$  solution; stress resulting from 1-time administration

of 0.2 ml 0.1% adrenaline solution; stimulation of microsomal systems by administration of phenobarbital 80 mg/kg over three days once per day; two days fasting (water still supplied). The livers of mice in two lines CBA and C57Bl differing in frequency of spontaneous liver carcinogenesis were studied. In all experimental states survived by the animals an additional mechanism of stabilization of the membrane potential was observed in vitro in comparison to a control group which had not experienced the experimental influences. The magnitude of the stabilization effect was approximately the same under all conditions, but stabilization was 'turned-on' more quickly in a liver exposed to  $CCl_4$  than to starvation, which in turn showed stabilization more quickly than a liver stimulated by phenobarbital. The effect was less in the regenerating liver following partial hepatectomy. The approach used in the article can be successfully used to estimate the functional status of the liver, its adaptation capabilities and the hepatotropic activity of chemical compounds.

Figure 1, references 7: 5 Russian, 2 Western.

[2092-6508/5915]

#### ELEMENT ANALYSIS OF SCLEROTIC FORMATIONS OF MAJOR BLOOD VESSELS BY LASER MASS SPECTROMETRY

Moscow BIOFIZIKA in Russian Vol 30, No 4, Jul-Aug 85  
(manuscript received 15 Aug 83; after revision 23 Oct 84) pp 655-660

ARABIDZE, G. G., BURKITBAYEV, S. M., BYKOVSKIY, Yu. A., KUTSENKO, A. I., LAPTEV, I. D., MANYKIN, E. A., PETRENKO, Ye. A. and TIMOSHIN, V. T., Moscow Engineering-Physical Institute; All-Union Cardiologic Scientific Center, Moscow

[Abstract] A study is presented of the element and isotope composition as well as changes in natural propagation of isotopes of elements in sclerotic (plaque) formations developing on the walls of the blood vessels in atherosclerosis by laser mass spectrometry (LMS). Sections of sclerotic arteries in various stages of development of atherosclerosis were studied. Before placement in the ion source chamber, the specimens were dehydrated with a 10% formalin solution and by exposure to various concentrations of tartaric acid, then dried at 37°C and atmospheric pressure. Experiments showed that atherosclerotic plaque consists of 12 to 16 elements. The total content of isotopes of the macrocomponents was determined mathematically. Significant changes in the content of trace elements were observed in various stages of vascular damage, anomalous disorders in the natural distribution of isotopes of oxygen, silicon, magnesium and calcium were observed in various stages of the development of atherosclerosis. Figures 2; references 15 Russian.

[2092-6508/5915]

BIOTECHNOLOGY

SUITS AND CHAMBERS FOR TREATMENT OF BURNS

Moscow TRUD in Russian 20 Aug 85 p 4

[Article by Veprik, V., Odessa]

[Text] Burns will be treated effectively with the aid of aerotherapeutic units that have been developed at the Refrigeration Machinery Association in Odessa. Following successful tests of these units at the country's largest medical centers, this enterprise has begun producing the first such 'pressure suits,' which for now are available only in a size for child patients.

The principle of air conditioning was utilized in the units. Air passes through an intricate system of filters, which remove all harmful microorganisms from it. A sterile barrier, so to speak, is thus created between wounds and the outside environment. If an extensive area of the body has been burned, the patient is placed inside a kind of pressure chamber. Depending on the degree of the burns, cooled or heated air is fed into the chamber, which relieves pain. Aerotherapy has enabled medical personnel to transfer to the method of treating open wounds without dressings. Recovery begins two to three times as quickly as it does when conventional methods of treatment are used.

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## INTERFERON PRODUCTION AT RENAMED PHARMACEUTICAL PLANT

Moscow MEDITSINSKAYA GAZETA in Russian 28 Aug 85 p 2

[Article by Povrivko, Ye., Dnepropetrovsk]

[Excerpt] The USSR Ministry of Health Dnepropetrovsk Plant for Production of Bacterial Preparations has been transferred to the Ministry of the Medical Industry and is now called the Dnepropetrovsk Chemical-Pharmaceutical Plant.

"For many years, we have been producing medicines acutely needed by public health, at our own initiative, in addition to producing bacterial preparations," related Candidate of Medical Sciences V. S. Sotnikov, director of the plant. "Among them are cocarboxylase, mannite and urea for injections, and physiologic solution and glucose in bottles. Moreover, no other plant in the country but ours produces cocarboxylase, mannite and urea.

"For a long time, the plant made preparations which helped to combat influenza. One of them was interferon. These preparations have now been transferred to other enterprises. But the plant will go on producing interferon for about five more years. This is because the need for this preparation is great, and the plant has a well-proven interferon production process. Moreover, we shall introduce a new and more advanced interferon process next year, which will make it possible to increase substantially shipments to medical institutions and pharmacy enterprises of the country.

"The plant will also have a part in the USSR Food Program. A preparation, 'Bakterin-SL', has been tested which not only protects animals against diseases but helps them gain weight quickly."

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CHANGES IN CELL-MEDIATED REACTIVITY OF GUINEA PIGS DURING SENSITIZATION WITH  
BACILLUS THURINGIENSIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 6, Jun 85 (manuscript received 15 Mar 84) pp 75-77

PADALKIN, V. P., SHUVALOV, L. P., GOLIDONOVA, N. D. and DOMBROVSKIY, N. I.,  
All Union Scientific Biotechnological Research Institute, Moscow

[Abstract] Bacterial insecticides from *B. thuringiensis* are widely used to control pests of agricultural products and thus they come in contact with humans and animals. Although many authors claimed that these agents are non-toxic, others indicated possible relationship to infections of the gastro-intestinal tract. Using guinea pigs, the ability of various *B. Thuringiensis* agents to alter their immunological reactivity was studied. Subcutaneous injection of *B. Thuringiensis* var. *galleriae*, var. *dendrolimus*, var. *insectus* led to alteration in the immunological reactivity of the test animals of both the specific and nonspecific type, manifested by increased sensitization of leukocytes to specific allergens and by increased phagocytic reactivity of peritoneal macrophages. The most drastic changes were observed with the var. *galleriae*. References 5 (Russian).

[2096-7813/5915]

ENVIRONMENT

ENVIRONMENTAL PROTECTION IN ARMENIAN SSR: PROBLEMS AND SOLUTIONS

Yerevan PROMYSHLENNOST ARMENII in Russian No 3, Mar 85 pp 60-62

ABOVYAN, Yu. I., Head of Department of Nature Protection, Gosplan, Armenian SSR

[Abstract] A conference, "Comprehensive Studies of the Biosphere and Processes of Formation of the Noosphere in a Region (with the ArSSR as an example)", held in Yerevan at the end of last year, provided much information on ecological problems in the republic and attempts being made to improve the existing conditions. The very complex ecological situation in the republic, caused by the limited amount of land and water, the diversity of climatic, topographic and geological characteristics and rapid growth of industry, transportation and urban area, call for special measures to combat environmental degradation. Measures being taken to preserve and restore Lake Sevan are discussed in some detail. Air pollution problems existing in Yerevan, Kirovakan, Alaverdi, Rozdan and Ararat are discussed with brief accounts of problems existing in each city and steps being taken to solve them. The advisability of introducing a complex program to improve ecological conditions in the republic is discussed and some measures being planned or carried out in order to implement such a program are described and discussed.

[2030-2791/5915]

## EPIDEMIOLOGY

UDC 616.98:579.881.13]-036.2(477)

### CLINICO-EPIDEMIOLOGICAL CHARACTERISTICS OF Q FEVER IN CARPATHIAN FOOTHILLS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 4, Apr 85, pp 80-81

[Article by A. A. Sukhopyatkina, O. S. Bat, A. V. Levitskaya, and V. G. Potapova, Ivano-Frankovsk Oblast Sanitary-Epidemiological Station]

[Text] The polymorphism and relative lack of severity of the clinical course of Q fever, as well as the multiplicity of ways of its transmission, lead to a situation in which this disease can go unrecognized. In connection with this, deeper study of the characteristics of its epidemiology are making it possible to establish the presence of natural and anthropuritic foci of this infection (2-4).

We began the epidemiological investigation of Q fever in 1975 and have been continuing to study the infection of the population. In 1975 blood serum from 216 individuals was studied in a complement fixation test with *Coxiella burnetii*, with negative results. In 1976, 2.1 percent of those examined were found to have a complement-binding antibody to *C. burnetti* in titers of 1:10-1:80.

In 1977, one of the rayons of the oblast kept records of group illnesses among people. A diagnosis of Q fever was established for 18 sick people based on epidemiological, clinical, and laboratory data (the titer of antibodies varied from 1:40 to 1:1280 in dynamics). The course of the disease was moderately severe in the overwhelming majority of sick people. The disease began abruptly with an increased body temperature up to 38-49 degrees centigrade, accompanied by chills, marked hyperhidrosis, and severe headache with no specific location. On the second or third day, there was combined overall weakness, loss of appetite, dry cough, disruption of sleep, retrobulbar pain, dizziness, and vomiting. Hyperemia of the face and injection of vessels of the sclera, hyperemia of the fauces, herpes, uniform gray-white fur on the tongue, relative bradycardia, and hypotension were objectively observed; hepatosplenomegaly was found in half the patients. The length of the feverish period varied from 7 to 12 days. The temperature curve for two of the patients was wave-form, while the rest were irregular types.

The illness rate had a very pronounced job-related quality, and was recorded among workers on a dairy farm where animals with antibodies to *C. burnetti*

were discovered (of the 520 cattle examined, 15.5 percent were found to have the antibody in a titer of 1:10-1:80). A total of 24.5 percent of the workers on the farm became sick, and the serum of 20.7 percent of 103 people who associated with the patients reacted positively to a complement fixation test with the Burnet antigen (antibody titers 1:10-1:20). The infection of the people occurred, clearly, aerogenically. This is attested by the simultaneous onset of the disease and its presence among sick people who had not consumed milk from the farm (the director, guard, metal worker, and 23 associates of the milk plant). But it was impossible to completely rule out the alimentary path.

In order to study the infection of the oblast population with Q fever during 1975-1982, 6,833 serums were studied in complement fixation tests with Burnet antigen; 2.13 percent of those examined were found to have antibodies to Burnet antigens in titer 1:40-1:80. At this time, the highest percentage of people with antibodies to *C. burnetii* (6.02 percent) was established in the rayon which recorded group illness with Q fever among people. Among the high-risk groups examined (workers on livestock raising farms, meat combines, and zoological and veterinary workers), the number of people with positive serological reactions was 3.9 percent. The highest risk group for infection by *C. burnetii* was workers of livestock-raising farms, and the second highest was in meat combines.

It is known that circulation of the agent is accomplished with the participation of several types of ticks which feed on agricultural animals in the imago phase (1, 4, 5). Accordingly, we caught and studied 170 mouse-like rodents and 325 cattle ticks. In order to reveal the infection of the ticks, they were placed on guinea pigs to infect them and serum from them was later studied in a complement fixation test with the Burnet antigen. Studies were carried out in the region of the worst epidemiological trouble, but they failed to yield positive results.

Thus, we established that in one of the rayons of the oblast there existed an active anthropuritic focus of Q fever, manifested by group illness of the personnel working on dairy farms. The source of the infection for people was cattle, and the main method of transmission of the infection was aerogenic. A higher rate of infection by Q fever was observed among workers in livestock raising farms and meat combines.

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## EPIDEMIOLOGICAL SUPERVISION OF POLIOMYELITIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 4, Apr 85, pp 81-85

[Article by Yu. I. Vaserin, L. V. Vlasova, R. G. Balakireva, S. F. Zakirova, N. V. Patsuk, and N. Ya. Venediktova, Sverdlovsk Scientific-Research Institute of Virus Infections, RSFSR Ministry of Health: "Urgent Questions of Epidemiological Supervision of Poliomyelitis"]

[Text] Successes connected with the use of live vaccine from strains of Sabin have led to a sharp reduction in the rate of paralytic poliomyelitis. Further reduction of the illness rate was connected with the removal of "wild" strains of polio virus from circulation by vaccines (15, 17). But the wide circulation of vaccines of strains of polio virus and the changed immunostructure of the population have created additional complexities in interpreting the results of clinical, laboratory, and epidemiological studies in diagnosing diseases suspected of being poliomyelitis. During the period of mass vaccination, in making the diagnosis, practically no consideration was given to an important characteristic of this infection--the substantial "disposition" expressed in the predomination of mild, worn-out [stertyye], and unapparent forms over clinically expressed diseases (14).

The events of the last decade have shown that under conditions of mass vaccination various regions of our country record isolated cases and outbreaks of poliomyelitis. A thorough description has been made of a period of epidemic increase in the rate of poliomyelitis in Sverdlovsk in 1969-1972, when epidemiological, virological, and serological methods were used to establish the polio virus etiology of most of the cases of paretic diseases (9). Since the early 1970s information has appeared on the increased number of paretic diseases similar to poliomyelitis in their clinical profile, and even their appearance in regions where poliomyelitis has not been recorded for a number of years (1, 3, 7, 12). Nevertheless, it should be acknowledged that for the extent of the entire period of mass vaccination mainly manifest cases of poliomyelitis were recorded, without taking into account the worn-out forms, which did not reflect the true rate of disease from this infection.

The appearance of sporadic cases and isolated outbreaks of poliomyelitis is explained by "drift" or the revival of circulation of "wild" strains of polio virus (1, 5, 11), and also by the lower level of collective immunity, especially in younger groups of children (5, 7, 9). A weakened humoral immunity

and increased number of people lacking antibodies was recorded in the 1970s in Krasnodar Kray (10), Sverdlovsk, Khabarovsk, and Kuybyshev (5, 9, 12, 16), Azerbaijan (4), and other regions (2, 7, 8, 13).

The discovery of cases of poliomyelitis, the polymorphism of its clinical manifestations, and the possibility of revival of circulation of "wild" strains of the virus on a background of a relatively low level of humoral immunity among the population of children prove that the problem of poliomyelitis has not lost its urgency in our day. Questions which remain unclear are the preservation of "wild" strains of polio virus, and the role of fluctuations in the level of humoral immunity among individual age groups in the development of outbreaks and sporadic cases of poliomyelitis.

All of this testifies to the need for developing a program of epidemiological supervision of poliomyelitis whose basic goal should be to further reduce or stabilize the poliomyelitis rate at the low level which is currently observed. This program should be uniform for all regions, and the methods of research used should be standardized as much as possible. The experience in organizing epidemiological supervision of poliomyelitis in certain regions of the RSFSR allows us to consider its basic tasks to be the early discovery of cases of poliomyelitis by mandatory virological and serological examination of sick people and those in contact with them in the focus, control over the circulation of polio virus among healthy children and in the outside environment, observation of the immunological structure of the population of children, and analysis of the quality of inoculation work against poliomyelitis among children of the age group being vaccinated.

Early discovery and recording of manifest cases of poliomyelitis by its clinical manifestations do not present great difficulties. But the presence of a psychological barrier in medical workers, which arose because of the sharp reduction of the disease rate from this infection as a result of mass vaccination, has still not been conclusively eliminated, as a result of which hypo-diagnosis can occur, and even cases of unwarranted reversal of the diagnosis.

As a result of the preventive measures currently being carried out, the predominant forms of poliomyelitis are mild and worn-out forms which occur in the form of paretic diseases which, as a rule, are not officially taken into account in analysis of the infection rate by an epidemiological service. This leads to a situation in which the recording of only manifest forms of poliomyelitis far from completely reflects the true epidemiological picture with regard to this infection. At the same time, discovering mild cases of poliomyelitis and diseases similar to it helps in timely isolation of the sick, especially from organized children's collectives, as well as early hospitalization and treatment of the sick, and implementing effective antiepidemic measures. In doing this, particular attention should be focused on the discovery of sick people during the summer months, when a seasonal increase in the rate of poliomyelitis is observed.

Many years of systematic observation in Sverdlovsk have shown that mild cases of poliomyelitis are characterized by mono- and parapareses of the lower limbs (83 percent), muscular hypotension (60 percent), stiffness (12 percent), and weakened (10 percent) or completely absent (3 percent) reflexes. In most

cases (83 percent), children are discharged from the hospital with complete recovery (6). According to the data of research carried out in recent years (1976-1981), poliomyelitis viruses were detected in 1.2-7 percent of cases of persons sick from mild paretic diseases, while the percent of serological confirmation of a polio virus infection was low and varied insignificantly (8.3-11.5). The relatively low level of laboratory confirmation of the diagnosis of poliomyelitis among sick people of this group might be connected with the definitely low individual weight of the polio virus infection during these years and the possible etiological importance of other viruses (Coxsackie group V) in the development of these diseases. At the same time, it must be taken into account that under conditions of mass vaccination of poliomyelitis it is hard to expect to obtain positive results (in the form of a fourfold increase of the antibody titer) in an absolute majority of sick people.

Based on many years of research, we have established that the percentage of people lacking antibodies to polio virus is subject to greater fluctuations than the value of the average geometric antibody titer, and is therefore a more informative indicator for assessing immunity among those inoculated. It is also very important to compare the percentage of individuals with a high antibody titer among healthy children and sick ones (in the second sample of blood). The variation of this ratio for various years, also taking into account the percentage of individuals lacking antibodies, has made it possible to establish the etiological role of polio viruses (types I and III) in assessing the nature of the paretic diseases recorded during certain periods in Sverdlovsk.

The characteristics of virus detectors have great significance in the system of epidemiological supervision of poliomyelitis. In order to get more reliable data on the circulation of "wild" strains of polio viruses, when carrying out virological examination of healthy children, material for study must be taken no earlier than 1.5 months after the last immunization with live poliomyelitis vaccine, since this makes it possible to determine the true amount of virus carried, rather than the detectability of vaccine strains. Data on the preferential detectability of enteroviruses during certain years are of interest for assessing the epidemic situation which has developed. Virological research on the characteristics of the level of virus carriers and the typical composition of circulating enteroviruses should be carried out yearly, beginning in April and continuing through the entire summer period, among healthy children from 1-7 years of age.

Under conditions of low circulation of polio viruses in carrying out epidemiological supervision of poliomyelitis, this has informative value not only in the results of studying the humoral immunity to polio viruses, but also in data on the state of inoculation in children, especially those up to 4 years in age. The state of inoculation should be evaluated yearly, and on sufficiently representative material: at least 10 inoculation cards (forms No 63 and 112) per 1,000 children of vaccination age.

Analysis of primary documentation has shown that in recent years, when a liquid poliomyelitis preparation has been widely used instead of the pellet vaccine, the main disruption is an increased interval between inoculations against poliomyelitis in vaccination and revaccination, and as a result of

this, a decrease in the number of vaccinations received by a child which are necessary according to age, which leads to a significantly reduced proportion of children susceptible to poliomyelitis. Because of this, checking of the quality of inoculation work should be under the constant control of epidemiologists.

Serological research is an essential stage of any program of epidemiological supervision of infectious diseases in which specific preventive agents are used to combat them. Systematic observation of the state of collective immunity makes it possible to get operative data on the quality of the vaccination being done, which in turn makes it possible to introduce in a timely fashion the necessary correctives in programs of immunizing the population.

To carry out immunological research, blood serum is collected from children of various age groups (from 1 to 7 years old) who have had no fevers during the period of examination and for whom at least 1.5 months have passed since the last inoculation against poliomyelitis. The mandatory condition for carrying out such research is setting up a neutralization reaction of the virus in a tissue culture with "wild" strains of poliomyelitis virus of types I, II, and III. It is also worthwhile to use for these purposes transplant cell cultures which are standardized by cytogenetic and virological criteria from the Sverdlovsk Scientific-Research Institute of Virus Infections cell culture bank, which makes it possible to get relatively comparable results for different regions.

In accordance with all of this, a program of epidemiological supervision of poliomyelitis should be developed for each administrative region which includes early and complete discovery of all cases of this infection, regardless of the severity of the illness, analysis of the quality of vaccination, and determination of the immunological status of the population of children and the characteristics of polio virus circulation. This program should precisely delineate the tasks and functions of establishments and organs of practical health care which are responsible for implementing epidemiological supervision in separate regions of the country. The data obtained during this supervision can be used for timely prediction of undesirable changes in the epidemiological situation and operative implementation of purposeful organizational and anti-epidemic measures.

#### Conclusions

1. Under conditions of mass vaccination, sporadic cases of poliomyelitis can be observed among inoculated children.
2. Development of a program of epidemiological supervision of poliomyelitis for each administrative region has been proven necessary.

[Item 3 missing in original]

4. Epidemiological supervision of poliomyelitis should provide for early and complete discovery of all cases of the infection, regardless of the severity of the illness, analysis of the quality of vaccination, and determination of the immune status of the population of children and the characteristics of circulation of polio viruses.

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EFFECTIVENESS OF SELECTIVE REVACCINATION OF SCHOOL CHILDREN AGAINST MEASLES

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun '85 (manuscript received 11 Jul 84) pp 30-34

FELDMAN, E. V., KAPUSTIK, L. A., BELOUS, T. I., BURYAK, V. N., KUZNETSOVA, N.K., PARKHOTS, T. M. and GORELKOV, K. P., Belorussian Scientific Research Institute of Epidemiology and Microbiology, Minsk Municipal Sanitary-Epidemiological Station

[Abstract] During the last two decades, epidemiological studies showed a shift of measles cases towards older children. 70% of all measles cases among previously-vaccinated individuals are in the schoolage group, showing that their immunity was not adequate. It would appear that a repeat of vaccination might be necessary. The goal of this study was to evaluate the effectiveness of such vaccination. In April 80 and Feb 81, 36,289 schoolage children were revaccinated in Minsk; all of them were originally vaccinated in the 1967-1972 period. Analysis of the data showed that selective revaccination changed substantially the age distribution of measles (age group, cases per 1000 being reported): less than 3 years, 5.32; 3-6 years, 3.01; 7-14 years, 2.53. The fraction of measles cases dropped to 15.5% for these children as compared to 62.6% from prerevaccination period. References 12: 9 Russian, 3 Western.

[2096-7813/5915]

UDC 615.371:579.842.23].012.6

USE OF BRUCELLA PHENOL EXTRACT FOR PREPARATION OF SPECIFIC ANTISERA AGAINST YERSINIA ENTEROCOLITICA 09

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian, No 5, May 85 (manuscript received 31 Aug 83) pp 49-52

SOKOLOVA, Ye. Ye., YAGOVKIN, E. A. and GURLEVA, G. G., Scientific Research Anti-Plague Institute, Rostov-on-Don

[Abstract] In view of the antigenic cross-reaction between *Yersinia enterocolitica* serovar 09 and the various *brucella* species, phenol extraction was conducted on *Br. abortus* P-93 to isolate the common antigenic complex and, via cross-absorption, prepare specific anti-09 antisera for use in differential diagnosis. The phenol extract, consisting of a preparation of 40% protein,

4% nucleic acids, and 17% polysaccharides, was used for i.m. immunization of outbred rabbits and tested for reactivity with antisera raised against killed *Y. enterocolitica* 09 cells. The standard immunoprecipitation and agglutination studies showed that the phenol extract contained the antigenic determinants common to brucella and *Yersinia enterocolitica* 09 and, following absorption of the antiyersinia sera, rendered it completely specific for 09. In view of the clinical similarity between the diseases caused by these two microorganisms, the availability of specific anti-09 sera can be a key diagnostic tool in differentiation between them. Figures 1; references 9: 1 Russian, 8 Western.  
[2090-12172/5915]

UDC 616.36-002-022-036.2-084.4

EPIDEMIOLOGIC PATTERNS OF HEPATITIS A DISSEMINATION AND IMPROVED CONTROL MEASURES

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 14 Dec 84) pp 58-63

ALEYNIK, M. D., Scientific Research Institute of Epidemiology and Microbiology, Gorky

[Abstract] A brief review is provided of the epidemiologic characteristics of hepatitis A in the RSFSR, and of the steps that can be taken for short- and medium-range prognosis. Analysis of uneven morbidity patterns in the RSFSR have revealed an inverse correlation between morbidity and population density in the different areas ( $r = -0.7$ ), and a positive correlation between morbidity and the increase in population ( $r = +0.68$ ) and of the proportion of children below the age of 14 ( $r = +0.86$ ). In the urban centers hepatitis A morbidity diminishes in proportion to the increase in population, and as a result hepatitis A has become a problem largely of small cities and towns. Short- and medium-range prognosis of hepatitis A outbreaks can be derived from statistical analysis of the incidence in interseasonal periods with appropriate application of regression and correlation analyses. On the basis of the anticipated outbreaks, programs of immunoglobulin administration to children can be planned in a more rational and effective manner. References 28: 24 Russian, 4 Western.  
[2090-12172/5915]

UDC 618.3-022.362-036.2-07(47+57)

INCIDENCE OF SEROPOSITIVE Hb<sub>S</sub> Ag PREGNANT WOMEN IN VARIOUS SOVIET REPUBLICS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 11 Jan 84) pp 64-66

MIKHAYLOV, M. I., IVANKIN, A. A., FOMICHENKO, N. I., ZUBOV, S. V., ZHAVORONOK, S. V., KOZHUKHAR', A. Ye., VOROZHBIYEVA, T. Ye., LISTOVSKAYA, Ye.K., YASINSKIY, A. V., MASTYUKOVA, Yu. N. and ANAN'YEV, V. A., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Passive hemagglutination and rocket immunoelectrophoresis were used to test the sera of 2316 pregnant women and 3165 blood donors in various regions of the USSR for the presence of Hb Ag. In general, there was a close correlation between the control incidence of seropositivity and that of pregnant women. The highest incidence of positive individuals was uncovered in Kishinev, Moldavia (9% for both groups), and the lowest in Vitebsk, Belorussia (0.8% donors, 1.5% pregnant women). The overall incidence of seropositive women was 4.9% for the USSR, versus a figure of 4.3% for the controls. In addition, the passive hemagglutination test uncovered twice as many positive cases as the widely-used rocket immunoelectrophoresis technique. References 6: 1 Russian, 5 Western.

[2090-12172/5915]

UDC 616.98:579.841.93]-078.73

USE OF PROTEIN-POLYSACCHARIDE BRUCELLA ANTIGEN IN ALLERGODIAGNOSIS OF BRUCELLOSIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 6 Apr 84) pp 83-86

DZHASYBAYEVA, T. S., SUKHODOYEVA, G. S., VERSHILOVA, P. A., DRANOVSKAYA, Ye. A. and KASYMOVA, Kh. A., Scientific Research Institute of Epidemiology, Microbiology and Infectious Diseases, Alma-Ata; Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Further studies were conducted on the newly-isolated protein-polysaccharide antigen (PPA) isolated from brucella to determine its suitability as a diagnostic reagent in leucocyte migration inhibition tests (LMIT). For refinement of the tests various doses of PPA were employed, and compared with results obtained by using brucellin. Unlike brucellin, which represents a filtrate fraction of a broth culture of brucella, PPA is the result of chemical extraction and is composed of 30% protein, 55% sugars, 7% lipids, 1% phosphorus, and 4% nucleic acids. Studies with leucocytes obtained from sensitized guinea pigs and occupationally infected and sensitized humans demonstrated that under proper test conditions PPA yielded positive LMIT results, comparable or even more sensitive than LMIT results obtained with brucellin. In the case of LMIT conducted with human leucocytes, the optimal doses of PPA fell in the 1 to 25 µg dose range per one milliliter of cell culture. References 8: 7 Russian, 1 Western.

[2090-12172/5915]

UDC 634/635-156+581.176+632.934

VARIATION OF ULTRASTRUCTURE AND MECHANICAL STRENGTH OF SKIN OF TOMATOES,  
APPLES AND GRAPES UNDER INFLUENCE OF OZONIZED ATMOSPHERE

Minsk VESTSI AKADEMII NAVUK BSSR, SERYYA BIYALAHICHNYKH NAVUK in Russian,  
1985, No 4, pp 31-35

[Abstract appearing on p. 124 of article by V. K. Matus, G. V. Kaler, A. M.  
Mel'nikova, A. M. Shibko and S. V. Konev]

[Text] Using the method of ultrathin slices the effect of ozone treatment on  
the structural organization of the cuticular layer of grapes, apples, and  
tomatoes was investigated. It was found that ozonation leads to the modifica-  
tion of the surface structures of the fruits, which is expressed in the com-  
paction of the epidermis and the waxlike cuticle adjacent to it on the outside.  
These changes entail an increase in the mechanical strength of the skin amount-  
ing to 120-200%. The effect is preserved for a long time and depends on the  
species and variety of crop.

Two tables, 1 illustration, bibliography with 15 titles.

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12822/5915  
CSO: 1840/2089

GENETICS

NEWS IN GENETICS AND SELECTION

Kishinev SOVETSKAYA MOLDAVIYA in Russian 10 Aug 85 p 2

TOMA, S., academician, MSSR Academy of Sciences, doctor of agricultural sciences, professor

[Abstract] The article reports on research published under the title "Recombinogenesis, a Factor in Evolution and Selection", a collective work directed by A. Zhuchenko, academician of the MSSR Academy of Sciences. The work challenges theories that these processes are purely internal, without relation to the surrounding environment, nourishment, etc. The authors show that recombinogenesis is directly related to the environment. Where an organism is well adapted to its environment, recombinogenesis is unlikely, but where conditions are unfavorable, the organism will change by recombination to fit those conditions. The authors' studies of, for example, tomatoes, have shown the possibility of increasing ten-fold the qualitatively new forms that can be produced. The human factor in the ecosystem and agrobiocenosis must take the lead in intensifying agricultural methods and production.

[2085-12131/5915]

## HUMAN FACTORS

### IMPROVING COMMERCIAL AIRCRAFT TRAINING SIMULATORS

Moscow VOZDUSHNYY TRANSPORT in Russian 10 Sep 85 p 3

[Article by Goryachev, V., head of the department of aircraft simulators of the State Scientific Research Institute of Civil Aviation, Moscow]

[Excerpt] It is no longer news to anyone that flight crews can be trained on the ground for the most difficult flight situations. Just 10 years ago, however, it appeared that the number of training flights in the air could not be substantially reduced. In 1976, we began to conduct studies of the use of technical means of instruction. Results of this research indicated that training with simulators could take the place of flight training of crews in preparation for spring and summer flight operations. Instructions from the Ministry of Civil Aviation to this effect were issued in 1977. This change has proved effective.

Effective use of comprehensive training simulators has become an important way of saving fuel. An analysis made by associates of the State Scientific Research Institute of Civil Aviation in 1984 indicated that such measures have made it possible to train flight personnel while using only one-third as much aviation fuel as would be required if simulators were not used.

Maximum use of simulators for training crews of such airplanes as the IL-86 and IL-76 is particularly important. For example, the introduction of a comprehensive training simulator for the IL-86 airplane (KTS IL-86) has made it possible not only to shorten flight training and retraining of pilots, but also to save more than 10,000 tons of scarce fuel annually.

Possibilities for further savings are far from exhausted, however. Flight training in flight schools still takes up a large portion of their time, the benefit yielded by helicopter training simulators still is not large enough, and possibilities exist for reducing unproductive flight time in a whole series of training programs for crews of the IL-62, Tu-134, YAK-42 and other airplanes.

The effectiveness of helicopter training simulators can be heightened by improving their technical equipment. Unfortunately, pilots are now able to use only half of all training programs. In existing helicopter training simulators, such procedures as vertical takeoff and landing, maneuvering at low altitudes and flights with slung cargo cannot be practiced because the technical level of systems for simulating the visual situation is not high enough.

The technical equipment of airplane training simulators also has deficiencies. This applies particularly to simulators that have been in service for a long time. They are not equipped with optical-collimation devices for reproducing visual images; our industry is not producing enough of them.

Work is now in progress at our institute on determining prospects and the most important paths for the advancement of simulator technology. We are carefully analyzing and studying foreign experience. The immediate task for Soviet simulator building is to ensure that training simulators make it possible to perform 90-95 percent of all the exercises called for by programs for the training and retraining of flight personnel. If this task is to be accomplished, flight models and systems for simulating the visual situation must be improved, as well as dynamic platforms.

FTD/SNAP  
/5915  
CSO: 1840/017

PROGRESS IN ENGINEERING PSYCHOLOGY

Yerevan PROMYSHLENNOST ARMENII in Russian No 3, Mar 85, pp 41-44

ARUTYUNYAN, Ye., correspondent PROMYSHLENNOST ARMENII

[Abstract] This article entitled "Man At the Control Panel" describes problems of engineering psychology being studied at the Yerevan State University Department of Psychology engineering psychology laboratory. The studies concentrate on improvement of training of operators, with the aid of technical devices, which requires development of new, special training apparatus. Laboratory personnel have developed criteria and principles of trainability of operators and have made recommendations concerning development and presentation of various training courses related to the work of chemical production operators, telegraph operators and civil aviation pilots. Each program has been developed for a specific institute. Development of a system of psychological and occupational selection of atomic electric power plant operators is discussed briefly. The importance of involving scientists of various specialties in the development of operator training devices is pointed out and discussed briefly.

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[2030-2791/5915]

IMMUNOLOGY

UDC 579.881:579.232].083.3

POLYPEPTIDE AND PHOSPHOLIPID COMPOSITION OF RICKETTSIA PROWAZEKII MEMBRANE AND ITS IMMUNOGENIC PROPERTIES

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 (manuscript received 31 [sic] Sep 84) pp 6-13

ZEZEROV, Ye. G., LOGINOV, V. S. and BEREZNEVA, A. S.

[Abstract] Qualitative data are reported of the phospholipid and polypeptide composition of Rickettsia Prowazekii membrane and its immunogenic and protective properties investigated. Based on electrophoresis and radioactive tagging data (<sup>125</sup>I, 7.5% polyacrylamide gel, 0.1% sodium dodecyl sulfate), at least 6 surface polypeptides were identified, five of which were isolated as membrane preparations. Relative content and molecular weight of 30 polypeptides were determined. The principal components were the following: phosphatidylethanolamine (68.4%), phosphatidyl glycerine (17.2%), phosphatidyl choline (5.1%) and cardiolipine (2.1%). These preparations were immunogenic; they formed specific antibodies in white mice. The preparations of membranes and surface polypeptide 3 (molecular weight 133,600 D) were shown to have protective activity (64% protective effect). Figures 2; references 23: 10 Russian (4 by Western authors), 13 Western.

[2096-7813/5915]

UDC 615.371:578.833.26].015.46.07

INVESTIGATION OF REACTOGENIC AND ANTIGENIC ACTIVITY OF CHROMATOGRAPHICALLY PURIFIED, CONCENTRATED AND INACTIVATED DRY VACCINE AGAINST TICK BORNE ENCEPHALITIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 (manuscript received 13 Jun 84) pp 34-39

POPOV, O. V., SUMAROKOV, A. A., SHKOLNIK, R. Ya., ELBERT, L. B., VOROBYEVA, M. S., KRUTYANSKAYA, G. L., RAZGULYAYEVA, A. V. and RASSHCHEPKINA, M. N., State Scientific Research Institute of Standardization and Control of Medicinal Biological Preparations imeni L. A. Tarasevich, Moscow

[Abstract] It is shown that the new, concentrated chromatographically-pure (CCP) vaccine against tick borne encephalitis (TBE) has moderate reactivity in doses of 0.5 and 1 ml. A direct relationship was established between the

frequency and intensity of postvaccination reactions of the vaccinated individuals and the dose. The highest indices of reactivity in individuals treated with CCP vaccine were noted after the first vaccination. CCP vaccine has high antigenic activity: virus-neutralizing antibodies are found in twice vaccinated individuals in 97-100% (0.5 and 1 ml with a six months hiatus) and antigen agglutinations in 75 and 91% respectively. This vaccine should be used for primary vaccination against TBE using two 0.5 ml injections 6 months apart. References 12: 10 Russian, 2 Western.  
[2096-7813/5915]

UDC 612.017.1-08

#### RESERVE POTENTIAL OF IMMUNITY

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 (manuscript received 13 Jun 84) pp 59-64

PERSHIN, B. B., KUZMIN, S. N., SUZDALNITSKIY, R. S. and LEVANDO, V. A., Central Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov; All-Union Scientific Research Institute of Physical Culture, Moscow

[Abstract] Immunity reserve is the adaptive ability of immunogenic organs to intensify their activity manyfold over the relatively resting state. Principal parameters of reserve potential of athlete's immune system were studied during adaptation to physical and psychemotional stresses. Using 350 highly qualified athletes it was shown that during the adaption to muscular exertion, immunological indices are maintained on the starting levels (those observed prior to stress). Excessive load may lead to exhaustion of immunity, shown by disappearance of various classes of immunoglobin from the blood and biological fluids 1 to 2 hrs after termination of the exercises. Four phases were identified covering the reaction of immune system to extreme stress: activation, compensation, decompensation and restoration. Figures 2; references 15: 13 Russian, 2 Western.  
[2096-7813/5915]

UDC 615.371:579.88[0.7

#### EXPERIMENTAL EVALUATION OF RICKETTSIA PROWAZEKII E USED IN VACCINE PRODUCTION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 3 Feb 84) pp 32-36

PSHENICHNOV, V. A., LUKIN, Ye. P., MIKHAYLOV, V. V., PASHANINA, T. P. and YURCHUK, B. G.

[Abstract] A comparative evaluation was conducted on the virulence and immunogenicity of three sublines of *R. prowazekii* E used in the preparation of commercial vaccines. Studies on guinea pigs demonstrated that the three sublines--288, 281 and 21--did not induce a febrile response in guinea pigs

as did virulent control microorganisms, nor did the animals differ in terms of nonspecific immune responsiveness to injection with these lines or in the incidence of anaphylaxis. However, the three sublines differed markedly in immunogenicity in terms of seroconversion (288 -- 76%, 281 -- 59%, 20 -- 17%), complement fixation titers (288 -- 1:17, 281 -- 1:6, 20 -- 1:2), delayed hypersensitivity (area of infiltration: 288 -- ca. 55 cm, 281 -- ca. 0.23 cm, 20 -- ca. 17 cm), and in immunity-overcoming infective dose (288 --  $10^{4.3}$  ID<sub>50</sub>, 281 --  $10^{3.5}$  ID<sub>50</sub>, 20 --  $10^{3.2}$  ID<sub>50</sub>). Differences were also noted in the infectivity and death rate of lice. These findings indicate that careful research has to be conducted on vaccine strains of *R. prowazekii* to select highly immunogenic varieties for the production of live vaccines because of their labile physiological and immunological characteristics. The poor results presently obtained with immunization with *R. prowazekii* E. vaccines are presumably due to the weak immunogenicity of this strain. Figures 1; references 17: 15 Russian, 2 Western.  
[2095-12172/5915]

UDC 615.371:579.88:579.253].07

#### COMPARATIVE PLAQUE ASSAY STUDY ON VACCINE AND VIRULENT STRAINS OF RICKETTSIA PROWAZEKII

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 7 May 84) pp 39-42

KHAMITOV, R. A., PSHENICHNOV, V. A. and GRABAREV, P. A.

[Abstract] Comparative plaque assay studies were conducted on virulent *R. prowazekii*, strain Breinl, and two avirulent sublines (288 and 281) of *R. prowazekii* E. Analysis of plaque formation on a monolayer culture of chick embryonic fibroblasts showed a higher rate of PFU with the virulent strain, while electron microscopy revealed that only 170 Breinl organisms were required for the formation of one plaque. A similar assessment in the case of *R. prowazekii* E revealed that up to 6500 rickettsia were needed to form one plaque. Differentiation between 288 and 281 was also found possible on the basis of early and late plaque formation, with the respective percentages of early plaques for the two sublines accounting for 39 and 23% of the total number of plaques. The plaque assay appears to be a promising technique for differentiating virulent from nonvirulent *R. prowazekii*, as well as in differentiating among the avirulent varieties. References 12: 4 Russian, 8 Western.  
[2090-12172/5915]

## LASER EFFECTS

UDC 577.343

### LIGHT INDUCED DAMAGE TO ERYTHROCYTE MEMBRANE SENSITIZED BY TETRASULFOPHENYL PORPHIN

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA BIYALAHICHNYKH NAVUK in Russian, No 4, Jul-Aug 85 (manuscript received 28 Dec 84) pp 103-105

[Article by A. V. Vorobey, T. N. Vadetskaya, G. D. Yegorova and Ye. A. Chernitskiy, Institute of Photobiology, Belorussian SSR Academy of Sciences]

[Text] In recent times researchers have displayed a great interest in the possibility of using porphyrins for the diagnosis and photoradiation therapy of malignant neoplasms. The lipophilic derivatives of hematoporphyrin have been widely used [1]. At the same time, there is great optimism regarding the use of the hydrophilic porphyrins also [2]. In order to devise effective methods of photoradiation therapy, it is necessary to investigate the mechanism of the photosensitized forms of cell damage. One of the basic targets of such damage is the cell membrane [3].

In the present study, the structural-functional changes in the erythrocyte membrane were studied by irradiating a suspension of erythrocyte shadows with red laser light in the presence of the hydrophilic porphyrin methyl-tetra(n-sulfophenyl)porphin (TSPP). The erythrocyte shadows were isolated from preserved donor blood by the method in [3]. The irradiation of the shadows (0.7 mg protein/ml) was performed in 150 mM NaCl+10 mM Na-phosphate buffer of pH 7.4 in the presence of 10  $\mu$ M TSPP with He-Ne radiation of the LG-75 laser ( $\lambda$ -633 nm) at a power density over the surface of the suspension of 300 W/m<sup>2</sup> and a thickness of the irradiated layer of 1 cm. The photo-damage to the lipids was determined from the accumulation of the products of their peroxidation as recorded by the TBK test [abbreviation not amplified in text] [4], the photo-damage to the proteins from the formation of cross-links of the polypeptide membranes as manifested in a decreased intensity of the bands of the gel electrophoregram obtained by electrophoresis of the proteins in polyacrylamide gel [5]. The photo-damage to the functional properties of the membrane was evaluated on the basis of the reduction of their permeability barrier to the strain 1-anilino-8-naphthalenesulfonate (ANS) [6] and by the inhibition of the transportation of glucose and pyruvate in the "pink shadows" of the erythrocytes [7, 8].

When the suspension of shadows was irradiated in the presence of TSPP, the accumulation of membrane lipid peroxidation products and an increase in the rate constant of binding of the shadows by ANS ( $K_{ANS}$ ), reflecting an increase

in the permeability of the membranes by the pigment, were observed, i.e., a reduction in their barrier properties (Fig. 1). As shown in [6], an important role in the ANS permeability of the membrane is played by the membrane lipids. Therefore, it can be considered that both processes (accumulation of lipid peroxidation products) and variation of the  $K_{ANS}$  are interrelated. This is attested by the presence in both processes of a "dark" stage--their occurrence after irradiated specimens are placed in darkness (Fig. 1).

The irradiation of the shadows also led to a decrease in the intensity of a number of bands on the gel electrophoregram of the membrane protein (Fig. 2). These changes are due to the cross-linking of the polypeptides, since simultaneously with the decrease in the intensity of the bands, a color appears at the start of the gel, reflecting the formation in the irradiated specimens of high molecular aggregates. The most photosensitive were the polypeptides of the basic peripheral protein, spectrin (a sharp decrease in the intensity of the bands of both of its polypeptides: 1 and 2, is observed). The cross-linking of the polypeptides of the integral proteins--bands 4.5 and 3--occurs more slowly. This cross-linking of proteins does not occur after the irradiated specimens are placed in darkness and is therefore not related to the process of membrane lipid peroxidation. The consequence of the photo-induced changes in the proteins is the inhibition of the transportation of the basic cellular metabolites--glucose and pyruvate--through the membrane, which also occurs only in light (Table).

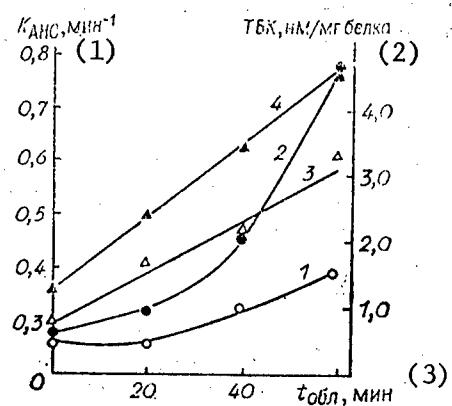


Figure 1. Quantity of TBK-active products (1,2) and rate constants of binding of AMS (3,4) in a suspension of erythrocyte membranes vs. irradiation time of the shadows in the presence of TSPP: 1,3: immediately after irradiation; 2,4: after the irradiated specimens were kept in darkness for 5 h.

Key: (1)  $K_{ANS}$ ,  $\text{min}^{-1}$ ; (2) TBK,  $\text{nM}/\text{mg protein}$ ; (3)  $t_{\text{irrad}}$ ,  $\text{min}$

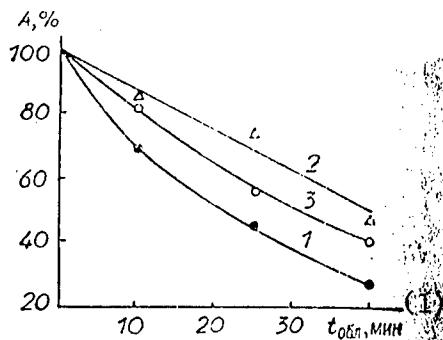


Figure 2. Intensities of bands on gel electrophoregram of erythrocyte membrane protein (1: band of spectrin, 2: band 3, 3: band 4.5) vs. irradiation time of the shadows in the presence of TSPP.

Key: (1)  $t_{\text{irrad}}$ , min

Table. Inhibition of catalyzed transport of glucose and pyruvate through membranes of "pink shadows" of erythrocytes upon irradiation of the suspension of shadows with the light of a helium-neon LG-75 laser in the presence of 10  $\mu\text{M}$  TSPP

Скорость транспорта (1), %	(2) Время облучения, мин				
	0	10	20	40	60
(3) Глюкоза	100	94,4 $\pm$ 2,5	76,4 $\pm$ 2,6	63,4 $\pm$ 6,4	61,0 $\pm$ 2,0
(4) Пищевая кислота	100	94,8 $\pm$ 4,2	85,0 $\pm$ 7,0	56,6 $\pm$ 8,2	60,4 $\pm$ 7,9

Key: (1) Transportation rate, %, (2) Irradiation time, min, (3) Glucose, (4) Pyruvate

A comparison of the results obtained with the data known from the literature on the sensitization of photo-induced damage to lipids and proteins of erythrocyte membranes by photo- and hematoporphyrins 9, 10 shows that the water-soluble porphyrin used by us has a photosensitizing activity close to that of the lipophilic porphyrins. Likewise, no significant differences are noted in the correlation of the photosensitivity of the various components of the membranes for these two types of sensitizers: the cross-linking of the proteins occurs earlier than the oxidation of the lipids, and the polypeptides of the peripheral spectrin network are cross-linked more readily than the polypeptides of the integral protein.

The results obtained testify to the high photosensitizing activity of the water-soluble tetrasulfophenylporphyrin in the damage of cell membranes. The mechanism of the photo-damage of cells is probably one and the same for the different porphyrins: oxidation of the components of the membrane, subsequent destruction of their barrier and transport functions, leading to lysis of the cells.

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CSO: 1840/2089

COVALENT CROSS-LINKS BETWEEN FILAMENTS IN DNA INDUCED BY LASER

Moscow BIOFIZIKA in Russian Vol 30, No 4, Jul-Aug 85  
(manuscript received 25 Apr 84) pp 568-570

ZAVILGELSKIY, G. B., GURZADYAN, G. G. and NIKOGOSYAN, D. N., Institute of Molecular Biology, USSR Academy of Sciences, Moscow; Institute of Spectroscopy, USSR Academy of Sciences, Troitsk (Moscow Oblast)

[Abstract] A study was made of the formation of covalent cross-links and local denatured sectors in DNA under the influence of picosecond pulses of UV laser radiation. The kinetics of formation of these defects were studied by a fluorescent method using acridine orange dye, which forms complexes with DNA. Radiation at 266 nm was used with a pulse repetition frequency of 0.3 Hz, pulse length 30 ps, intensity  $10^{11}$ - $10^{14}$  W/m<sup>2</sup>. The molecular weight of the phage C<sub>d</sub> DNA used in the studies was about  $4 \cdot 10^7$  daltons, diluted in phosphate buffer pH 7.2 to a concentration of 15 micrograms/ml. The quantum yield of cross-links is about  $1.0 \cdot 10^{-6}$  over the entire range of intensities of  $10^{-1}$  to  $10^{11}$  W/m<sup>2</sup>. At intensities of over  $10^{11}$  W/m<sup>2</sup> the quantum yield of cross-links increases by an order of magnitude, to  $1.0 \cdot 10^{-5}$  at  $4 \cdot 10^{13}$  W/m<sup>2</sup>. Figures 2; references 6 (Russian).

[2092-6508/5915]

MEDICINE

PROGRESS IN REANIMATION PROCEDURES AT INSTITUTE OF GENERAL REANIMATOLOGY

Moscow TRUD in Russian 7 Aug 85, p 4

[Abstract] This article, entitled "Overcoming Death", presents an interview concerning the newly-established USSR Academy of Medical Sciences Institute of General Reanimatology with institute director V. Negovskiy, USSR State Prize Laureate, academician, USSR Academy of Medical Sciences. Negovskiy points out the importance of reanimation procedures in treating victims of trauma, which he lists as the third leading cause of death behind cancer and cardiovascular disease. He mentions some examples of use of reanimation procedures in Russian history, going back as far as 1694. He describes the critical 5-6 minute period of clinical death in which time restoration measures must be carried out to prevent irreversible consequences. He cites a case of a soldier who was restored to life after clinical death, in 1964, and presents excerpts from a case history of an 18-year old man who was revived after total cardiac arrest (asystole). He recommends the use of hypothermia as a promising method of extending the critical period between clinical death and the onset of biological death and gives some examples of the use of this phenomenon. He emphasizes the importance of training the public in first aid measures and heart massage procedures in order to be able to act in emergency situations.

[2027-2791/5915]

EXHIBITS CONCERNING SPARING MEDICINE AT 'ZDRAVOOKHRANENIYE-85' AT MOSCOW

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Aug 85 p 4

PONARINA, Ye.

[Abstract] Exhibits concerning sparing ["mercifully forebearing"] therapy, displayed at the "Zdravookhraneniye-85" Exhibition in Moscow, are listed and described briefly. The "Delta-102" relieves pain without use of other analgesics by preventing pain impulses from entering the brain and by inciting release of endorphin. "Akma" magnets, demonstrated by Yugoslav specialists, are helpful in alleviating migraine, toothache, sciatica, insomnia and can be used to assist efforts to stop smoking. The patients themselves fasten the magnets to acupuncture points. The "Ritm" EKG device takes readings from 64 points rather than the usual six and the data obtained are processed and displayed automatically. The comprehensive, automatic, republic system for

mass physical examinations "Kasmon", introduced in Latvia, employs electronic devices to allow one physician and 10 nurses to examine 13,000 patients. The "Kardiolayn" device, developed by Italian specialists, can be used to monitor physical parameters of patients after release by their physician. Other exhibits demonstrated surgical procedures employed at Ufa hospital No 10 to perform unique eye surgery procedures, the use of plasma-jet scalpels and a method of kidney stone treatment by shock waves in which the patient is subjected to shock waves (set up in water, electrohydraulically) after precise location of the stone and immersion in water.

[2028-2791/5915]

#### TITANIUM-PLASTIC PROSTHESES

Moscow TRUD in Russian 29 Aug 85 p 3

STRUZHENTSOV, D., Correspondent for TRUD

[Abstract] A popularized description is presented of a method developed by Prof Aleksandr Vasil'yevich Vorontsov for treatment of severely broken legs requiring upper femur prostheses. Titanium tubing is bent to model precisely the curvature and length of the patient's femur, then x-rays are used to model the exact shape of the ball of the hip joint in quick setting plastic. The body accepts these prostheses much more easily than the typical spherical ball metal prostheses used previously, allowing patients to walk within a month after surgery. One patient is reported to have forgotten which leg was operated on within a few months.

[2086-6508/5915]

#### BIOGLUE IN SURGEON'S ARSENAL

Tbilisi ZARYA VOSTOKA in Russian 24 Jul 85 p 4

CHERKEZISHVILI, N., editor

[Abstract] The article reports on developments in biologically compatible glues as presented at the First All-Union Symposium on the Question of "Wounds and Glue", held at Gurdzhaani, Soviet Georgia. The discussion covered the more than 20 years of Soviet experience in use of bioglues for various types of wounds. Glues have the advantages of not hampering the healing process or causing allergic reactions, stopping bleeding and sealing the wound area from outside contaminants. Bone operations involving ultrasound as well as bio-glues are discussed. Cyanocrylate glues MK-7, MK-8 for endoscopy and MK-9 for traumas have been used to close wounds on wet surfaces. One of the major problems is the low volume of production. Numerous new patents have been applied for, but the only factory producing such glues has total volume of 10,000 kg per year. The particular achievements of surgeons in Tbilisi, where for example Sh. Mirashvili has documented more than 300 applications of bioglue and has developed his own methodology for its use, are outlined.

[2087-12131/5915]

AEROTHERAPEUTIC EQUIPMENT FOR TREATMENT OF BURNS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Sep 85 p 4

VEPRIK, V. (Odessa)

[Abstract] This article reports on the Odessa Refrigeration Machinery Production Association's development and production of aerotherapeutic equipment for treatment of burns.

It is recalled that work on the development of aerotherapeutic methods was begun by a group organized by Grigoriy Samenovich Antonenko, general director of the Association. Specialists of the Odessa Medical Institute's burn center assisted this group and tested a pressure suit that the group developed. Doctor of Medical Sciences V. Zheleznyy is quoted in regard to features and advantages of aerotherapeutic units which are now in use at the burn center. They permit treatment of burns by the so-called dry method, which is said to be several times as effective as conventional methods. Cases of burns covering as much as 80 percent of the skin have been successfully treated with the aid of the pressure suits, it is claimed. Such suits can be transported quickly to other places for emergency treatment of burn victims. Both modernized suits and stationary units for the treatment of up to five persons at a time reportedly are in production at the Association.

FTD/SNAP  
/5915  
CSO: 1840/017

## MAGNETS AND SURGICAL PROCEDURES

Moscow IZVESTIYA in Russian 23 Aug 85 p 3

[Article by V. Sarel'yev, academician of the USSR Academy of Medical Sciences]

[Text] When we speak of the achievements of surgery in recent years we understand that these achievements do not exist alone, isolated from scientific and technological progress. The work of physicists, who are creating miniature magnets with great magnetic force, has permitted the opening of a new page in medicine--the widespread use of magnets in surgery. At the competition for the USSR State Prize for 1985 the work of a collective of medical personnel and engineers was presented, "The Development and Introduction into Clinical Practice of New Operations for Diseases of the Gastrointestinal Tract and Malformations of the Thorax Using Original Magnetic and Mechanical Systems."

This work was begun some ten years ago at the department of pediatric surgery of the Second Moscow Medical Institute (the research was headed by Academician of the USSR Academy of Medical Sciences, Yu. Isakov) and at the Scientific Research Institute of Proctology (here the supervisor was Corresponding Member of the USSR Academy of Sciences, V. Fedorov). The engineering research efforts were conducted by the collective, which was headed by Ye. Savkovym. A multitude of different magnetic structures were specifically created for various operations.

...Children sometimes have a congenital defect of the thorax, specifically of the anterior wall. In simple terms, the front of the child's thorax has "collapsed" inward. How can such a malformation be corrected? Formerly, surgeons performed a whole series of operations. Now only one operation is necessary. During it, after removing the malformation of the thorax, the surgeon inserts a magnetic plate enclosed in silicon behind the sternum. And then a special corset is put on the patient. This also has a magnet attached to it opposite the one already behind the sternum. With the aid of the attraction of these two magnets, the thorax is maintained in the proper position. On the third or fourth day the child can get up. After one-and-a-half to two months the corset is no longer necessary. In almost 90 percent of children who have been treated with this new method (200 of these operations have been performed) good results have been obtained. This is significantly better than with procedures used formerly. And the main thing is that due to the significantly smaller amount of surgical intervention, this treatment is easier and much less traumatic.

At this point it is necessary to make a small digression into the past. Before clinical experiments on the use of magnets in surgery could begin, medical scientists conducted a great amount of research through experiments on animals. At the level of the cell, organ and organism as a whole, they carefully studied whether or not their normal condition changed in a magnetic field. They conducted more than 500 experiments before they were able to say with confidence that regardless of the implantation site of the magnet they did not have a negative effect on the tissue.

The use of magnets in digestive tract surgery has proved very promising. Often a surgeon must make a suture after removing some intestinal tissue. As it turned out, magnets proved to be much better here than the usual sutures. Magnets draw together tender tissue, and in this case the sutures cannot come apart. At the site of the joining new healthy tissue grows and then the magnets are removed.

However, the significance of the new procedure in intestinal surgery is much broader. The use of magnetic structures has permitted an increase in the number of operations, particularly in areas which are not easily accessible.

With the aid of magnets it is possible to create "detours" in the intestine, for example, in order to temporarily seal off a section which is inflamed. This idea of "detours" created by magnets, or of deferred magnetic anastomosis, is also used in urology.

Magnets have proved to work very well in operations on serious intestinal injuries. Here magnets act as barriers. This permits the patient to lead a normal life following a major operation.

Thus a new direction in surgery has already been established. In over ten years the collectives of medical personnel named here have performed some 500 operations with remarkably positive results. Moreover, some 1,000 operations have been performed in various clinics and hospitals in the country using these procedures.

Much of what the originators of this work have proposed has been done by them for the first time in the world. Their precedence is protected by nine patents.

The originality of their solutions is such that their use is significantly improving the process of healing wounds, decreasing the risk of complications and lowering the fatality rate. All of this allows the years of work by a large collective of scientists and doctors to be deemed worthy of a high honor.

12793/5915  
CSO: 1840/2071

## MAGNETOCARDIOGRAPHY

Moscow LENINSKOYE ZNAMYA in Russian 21 Jul 85 p 4

[Article by A. Ruvinskiy: "The Magnetic Echo of the Heart" under the rubric "Medicine: The Twentieth Century"]

[Text] The least little ache or pain in the heart and we run to the doctor. "Doctor, what is the matter with me?" An exact diagnosis is required. After this, we are prescribed a course of treatment. But first we are invited into the functional diagnostics room. There an electrocardiogram is taken--the most common method today for finding out what has happened to the heart. Indeed, this electrical portrait of the heart becomes the key to the diagnosis.

There is no doubt that electrocardiography is effective, unfailing and quite informative. But is it enough? Can it reveal all the "secrets of the heart" by conscientiously tracing its intricate graphs by automatic recorder? Not always, experience shows. For now, there are still areas inaccessible to modern cardiology.

But "for now" does not mean forever.

In his efforts to understand the nature of things, the laws of their existence and interaction, man became involved with measurements. He measured everything possible, according to the level of his own development.

Today it is hard to think of any category, physical quantity or parameter not subject to modern measurement facilities. We have learned to measure practically everything, including magnetic fields.

These fields are diverse: everything depends on the object of measurement. Objects of the inorganic world emit a constant magnetic field, not varying in time. This is rather easy to evaluate. A variable magnetic field is more difficult. All living things possess such fields to more or less extent.

Life is movement, not only of an object in space. It is also the migration of electric charges in an organism. The moving charges produce a magnetic field inside the object, which is essentially variable, whether it be the motion of plant juices along the stalk or blood through the capillaries.

These variable fields are not easy to measure. In fact, the magnetic field of the Earth, which is also variable, would constitute a serious noise. And industrial noises also play their part. Therefore magnetography, or the investigation of biological subjects by recording their magnetic fields, required a precision instrument capable of coping with these natural noises.

Such an instrument was created several years ago at the Institute of Terrestrial Magnetism, the Ionosphere and Radio Wave Propagation of the USSR Academy of Sciences. A device known as a quantum gradient meter was developed at the magnetometry laboratory. This operates in such a way that all "extraneous" magnetic fields (the Earth's field, industrial noise) are simply subtracted during the examination of the subject and do not affect the final measurement outcome.

The instrument was designed and used successfully in the traditional experiments of the laboratory workers. But it was not in vain that we mentioned that magnetic fields are intrinsic to all living things. This includes the human organism. But the most "alive" part of the human is the heart: as long as it is beating, we are alive.

But the constantly beating heart should emit a strong magnetic field! If this could be registered, very useful data might be obtained. A. N. Kozlov, director of the laboratory and a candidate of physico-mathematical sciences, and S. Ye. Sinel'nikova, laboratory assistant, resolved on just such a project.

They fitted out the quantum gradient meter for the new studies: now all that is necessary is to approach the instrument and touch the ribcage to one of the sensors. Immediately, a curve is traced. This is the magnetic voice of the heart. While registered for the first time, there was something very familiar about it.

An electrocardiogram! But if this is so, how can we guarantee that the reference point has been properly chosen? After all, the electrocardiogram is recorded at strictly-designated sites. Then, 36 points are marked on the front of the ribcage, entirely covering it like a network. The doctors decide which are the most informative points.

But this will come later. The scientists are concerned with a different matter: what kind of information has been registered and how to work with it?

It resembles an electrocardiogram. But is it a perfect duplication or does it differ in some way?

It was then decided to take an electrocardiogram and a magnetic plot of the heart (called a magnetocardiogram by analogy) simultaneously at the identical points.

The patient M was 68 years old, suffering from acute cardiopathology. This was confirmed by the electrocardiogram. The goal now was to obtain different information about the functioning of the heart--magnetometric.

An experiment was conducted in cooperation with the doctors. Graphs were prepared. And the outcome?

The pattern of the magnetocardiogram differed sharply from the electrical parameters of the heart! Where the electrocardiogram excited no suspicion, remaining smooth and regular, the magnetic curves produced spikes and jagged teeth!

Supplementary information as to the condition of the heart? Something of the sort. But the patient was ill--the scientists knew of this beforehand. What if the experiment were conducted on subjects whom the doctors regarded as perfectly healthy?

Thirteen men ranging from 25 to 45 years were examined, none of them complaining of heart pain. Each "patient" underwent cardiodiagnostics--electrical and magnetic at the same time, following the identical procedure.

The result of the studies fully confirmed the hypothesis of the scientists: the electro and magnetocardiograms differed significantly. Whereas the electrical portrait of the heart excited no suspicion, the magnetic called attention to itself: the patient had latent pathologies. Although slight, they were still there.

But why was the information of magnetocardiography more complete? Magnetic fields are much less susceptible to distortions than are electrical signals.

But magnetic diagnostics is distinguished not only by more complete and exact information. The new method is a noncontact technique--it is not necessary to apply a lot of sensors to the body of the patient and attach them there, as is the case with electrocardiography. With the magnetic method, it is enough for the patient simply to approach the instrument and barely touch the sensor. There is a significant time savings for mass examination of patients. The method is absolutely harmless--it does not subject the person to any action and there are no adverse responses. Magnetocardiography can be used to investigate the function of the heart of a patient even if encased in plaster: the magnetic field knows no barriers.

But the main point is this. Is the new and heretofore undisclosed information about the situation of the heart the symptoms of an advancing illness?

The first step has been made--the advantages of magnetocardiography, a promising field of medical diagnostics, are clear, as the experiments have proven. True, the new method is still at the level of laboratory research. It is now time for the cardiologists to decide.

12717

CSO: 1840/2045

MICROBIOLOGY

UDC 579.843.94:579.24

ADHESION PILI IN YERSINIA PESTIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 (manuscript received 5 Sep 84) pp 13-17

VODOPYANOV, S. O. and MISHANKIN, B. N., Rostov-na-Donu Scientific Research Antiplague Institute

[Abstract] The goal of this work was to investigate expression of adhesive properties by *Y. pestis* cells and to characterize bacterial structures evaluating this phenomenon by means of agglutination reactions of human, guinea pig and rabbit erythrocytes. It was shown that the cells from all *Y. pestis* strains were capable of forming pili during cultivation in agar LB at 37°C. A preparation of adhesion pili from the Otten strain of *Y. pestis* was isolated and partially characterized indicating that these adhesion pili participate in expression of virulence of *Y. pestis*. The adhesion pili consist of protein sub-units with molecular weight of about 12,000 D and an isoionic point at pH 4.7. Preliminary treatment with nauradiminase increased the hemagglutination reaction of red cells while treatment with a mixture of gangliosides inhibited it. The data obtained led to the assumption that pili participate in attachment of the pathogens to tissues. Figures 5; references 13: 6 Russian, 7 Western.

[2096-7813/5915]

UDC 579.842.23.04:577.152.34

ACTION OF ACIDIN-PEPSIN ON YERSINIA PSEUDOTUBERCULOSIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 (manuscript received 6 Jun 85) pp 17-20

KUZNETSOV, V. G.

[Abstract] The barrier role of gastric juice is well known but it is not universal. Because pepsin rapidly inactivates the vaccine strain EB of *Y. pestis*, similar action could be expected against other *yersinia*, but this aspect has not been studied well. In the present paper, the effect of pepsin preparations on *Y. pseudotuberculosis* and other urease-positive *Yersinia* is reported. It was shown that in a acidin-pepsin solution (1:100) the *yersinia* died in 5-10 min when they were in a homogenous suspension; in conglomerates, 33.3 to 18.5% of *yersinia* cultures survived for 40-60 min. Among the

survivals, the rod shaped and the involuted forms predominated with preserved sensitivity to bactericidal effect of the enzyme; they reverted rapidly to coccoid form practically nonpathogenic in white mice. References 4 (Russian). [2096-7813/5915]

UDC 579.842.11.083.13

#### TESTING OF VARIOUS CULTURE MEDIA FOR PRODUCTION OF INTRACELLULAR THERMALLY LABILE ENTEROTOXIN BY ESCHERICHIA COLI STRAINS H74-114 AND 86

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 (manuscript received 17 May 84) pp 23-26

STEPANOVA, M. V., SHAGINYAN, I. A., NOSKOVA, V. P., VERTIYEV, Yu. V. and YEZENCHUK, Ye. V., Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Cultivation conditions of two toxigenic strains of *E. coli* were studied, looking for conditions needed for maximum accumulation of intracellular thermally-labile enterotoxins (TLE). It was shown that maximum accumulation of TLE from the H74-114 *E. coli* strain occurred on Evans medium and dry hydrolysate of casein; from the strain 86 it occurred on Evans medium, Hottinger bouillon and on aminopeptide. Production of TLE increased 10 fold in presence of an antibiotic (Lincomycin, 75-90  $\mu$ g/ml). Maximum accumulation of TLE occurred after 4-5 hrs of culturing, using  $10^8$  cells/ml of medium, aeration rate 3 l/min and 600 rpm stirring rate. The yield of TLE under such conditions was 1.4 and 1.0 mg/l of the culture medium for H74-114 and strain 86, respectively. Figure 1; references 20: 2 Russian, 18 Western (1 by Russian authors).

[2096-7813/5915]

UDC 579.8.083.13

#### PROSPECTS FOR DEVELOPING SOVIET DEHYDRATED CULTURE MEDIA

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 30 Oct 84) pp 25-32

RASKIN, B. M., Central Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov, Moscow

[Abstract] The lack of an adequate level of production and variety of dehydrated bacteriological culture media in the USSR and the COMECON countries led the USSR Ministry of Health to establish a laboratory for the development of such media at the Central Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov. Concomitantly, a plant was established at the Institute for the production of such media. A number of research and supply problems have to be addressed, not the least of which deal with shortage of various components of the nutrient media, including amino acids, indicators,

vitamins, nitrogen bases, and so forth. The situation facing the Soviet and fraternal socialist countries is quite different from that of the capitalistic firms (Difco, Merck, Oxoid) that are profit-motivated and do not perceive a need for less expensive ingredients. Active research in the USSR and the COMECON countries has led to the development of a number of substitutes that can be utilized in the preparation of dehydrated media, not the least significant of which is substituting blood hydrolysates for meat and its extracts. The resultant media are fully as effective as the standard media commonly in use in the Western countries. Figures 1; references 50: 1 Polish, 41 Russian, 8 Western.

[2095-12172/5915]

UDC 579.887.9.083.13

#### LIQUID CULTURES OF LEGIONELLA PNEUMOPHILA

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 1 Dec 83) pp 36-39

KOSTYUCHENKO, V. I., TARTAKOVSKIY, I. S. and PROZOROVSKIY, S. V., Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Comparative studies were conducted on the effectiveness of different liquid media in supporting the growth of *Legionella pneumophila* Philadelphia-1. Trials with proteosopeptone medium (I), proteosopeptone + yeast extract medium (II), and yeast extract medium (III) showed growth in all three cases with a lag time of 16-20 h. The initial growth rate was much greater on media I and II than on III, with medium II yielding the maximum biomass in 48-60 h ( $10^{10}$  to  $10^{11}$  CFU/ml at 37°C, pH 6.95). Media I and II were equally effective whether sterilized by autoclaving or filtration. Definitive studies with medium II showed that ferric pyrophosphate was not required for the growth of *L. pneumophila*, although in its absence and with low inocula the lag time was somewhat prolonged. These observations demonstrate that a relatively simple medium can be used for the cultivation of *L. pneumophila* in liquid culture, although it remains uncertain why ferric pyrophosphate is required for solid media. Figures 3; references 9 (Western).  
[2090-12172/5915]

UDC 616.98:579.841.11]-078.73

#### ANTIGENIC COMPOSITION AND SEROLOGIC DIAGNOSIS OF PSEUDOMONAS PSEUDOMALLEI

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 85 (manuscript received 11 Mar 84) pp 109-117

KOVALEV, G. K.

[Abstract] A mini review is provided of the antigenic structure of *Pseudomonas pseudomallei*, and the potential use of such antigens in the diagnosis of melioidosis. The latter is particularly important in view of the fact that

clinically inapparent infections may persist for years. Description is provided of the somatic O antigen, flagellar H antigen, membrane-bound K antigen, and the M antigen released on autolysis. Description is provided of conditions that favor their synthesis, their serologic activities, and diagnostic significance. Discussion of serological means of diagnosis includes mention that most authorities feel that maximum sensitivity and specificity is obtained with complement fixation and passive hemagglutination tests, while agglutination tests are the least reliable. To date, effective vaccines for melioidosis have not been obtained. However, it is interesting to note that mice immunized with BCG acquired immunity against intravenous infection with a virulent culture of *Ps. pseudomallei*. References 59: 19 Russian, 40 Western.  
[2090-12172/5915]

PHARMACOLOGY AND TOXICOLOGY

UDC 577.352.26:578.282

INTERACTION OF NEW ANTIVIRAL COMPOUND 2(1'-aminoethyl)bicyclo/2,2,1/heptane  
HYDROCHLORIDE WITH MODEL LIPID MEMBRANES

Minsk VESTSI AKADEMII NAVUK BSSR. SERYYA BIYALAHICHNYKH NAVUK, No 4, 1985  
pp 55-58

[Abstract, appearing on p. 125, of article by V. I. Votyakov, I. G. Kharitonenkov, V. A. Rusyayev, V. A. Tverdislov, S. El-Karadagi and A. N. Fedorov

[Text] Studies were made of the effects of the interaction of 2(1'-aminoethyl)bicyclo/2,2,1-heptane hydrochloride which has an antiviral effect, with double layered lipid membranes formed from azolectin. A change in the charge conductance and the modulus of transverse elasticity of the double-layered membranes was noted. The possible rôle of these effects in the antiviral activity of the compound is discussed.

Two illustrations, bibliography with 15 titles.

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12822/5915  
CSO: 1840/2089

UDC 615.373.3.012.6.07

#### PRODUCTION OF TETANOLYSINE PREPARATIONS AND THEIR PROPERTIES

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 (manuscript received 4 Jun 84) pp 3-6

SHABAROV, I. A., RUMYANTSEV, S. N. and POSPELOV, V. F., Leningrad Scientific Research Institute of Vaccines and Sera

[Abstract] The pathogenic and immunological role of tetanolysine (I) has, up to now, been poorly studied. Therefore, it was of interest to prepare a series of I compounds and to study their biological properties. *Clostridium tetani* 473 and Sh-30 strains were used to produce I which, on the basis of horse and sheep erythrocyte tests, were shown to be heterogenic in respect to the hemolytic activity of individual clone cultures. Formalin treatment of the filtrates of common and dialyzed *C. tetani* cultures led to total loss of hemolytic activity of I with retention of antigenic properties. The atoxigenic strain was the optimal strain for production of I; ammonium sulfate fractionation of dialyzed cultures obtained from it increased specific activity of the preparation more than 150 fold. The preparations obtained retained their activity for over one year. References 4: 1 Russian, 3 Western.  
[2096-7813/5915]

#### ANTIARRHYTHMIC ACTIVITY OF CROWN-LACTONE I: EFFECTS ON ACONITINE-MODIFIED SODIUM CHANNELS

Moscow BIOFIZIKA in Russian Vol 30, No 3, May-Jun 85  
(manuscript received 15 Aug 83; in final form 13 Feb 84) pp 427-430

LUK'YANENKO, N. G., BOGATSKIY, A. V. (deceased), SAVENKO, T. A., VONGAY, V. G., YAROSHCHENKO, I. M., NAZAROV, Ye. I. and SHAPKIN, V. A., Physical Chemical Institute, Ukrainian SSR Academy of Sciences, Odessa

[Abstract] Crown-lactone I (28-crown-8) was tested for its antiarrhythmic activity on guinea pig atrial model, and shown to be effective at a dose of 10.4 mg/kg in the aconitine mode. The LD<sub>50</sub> for albino mice was calculated at 2 g/kg on i.v. administration, and the therapeutic index was determined to be more than 200. In studies with isolated rat spinal ganglia neurons using crown-lactone I in an external concentration of 10<sup>-4</sup> M shifted the half

activation and inactivation potentials of rapid sodium channels by 7-8 and 7-10 mV, respectively, toward more negative values, and in the same concentration diminished the effects of  $2 \times 10^{-6}$  M aconitine on the volt-ampere characteristics of rapid sodium currents. The effects of crown-lactone I on phosphatidylcholine bilayer lipid membrane showed that it inhibited calcium ion-induced surface potential, suggesting that the antiarrhythmic effects of this compound involve attenuation of the effects of membrane-bound calcium on the myocardial membrane. Figures 3; references 15: 12 Russian, 3 Western. [2090-12172/5915]

UDC 547.964.4.07

NATURAL PEPTIDES AND THEIR ANALOGS. PART 35. SYNTHESIS AND PROPERTIES OF  
[Ala<sup>5</sup>,Orn<sup>9</sup>] SOMATOSTATIN

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 8, Aug 85  
(manuscript received 5 Mar 85) pp 1026-1036

SHVACHKIN, Yu. P., SMIRNOVA, A. P., YERMAK, N. M., FEDOTOV, V. P.,  
SADOVNIKOVA, N. V. and PLUZHNIKOVA, G. N., Institute of Experimental  
Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] Standard techniques of peptide chemistry were employed for the synthesis of [Ala<sup>5</sup>,Orn<sup>9</sup>]somatostatin (AOS), with a view toward securing somatostatin analogs with novel biological characteristics. Synthetic considerations were based on the fact that spatial factors required a small-volume nonpolar amino acid at position 5, if Lys<sup>9</sup> was to be replaced by Orn<sup>9</sup>. Alanine was selected to replace Asn<sup>5</sup> since previous studies had demonstrated that the Ala<sup>5</sup> somatostatin analog retained the natural activity of somatostatin. Determinations of the biological action spectrum of AOS was conducted with tissue cultures of rat adenohypophysis and pancreas. AOS was found to retain inhibitory activity for the secretion of somatotropin, insulin and glucagon. However, in distinction to the native hormone, AOS did not inhibit the secretion of prolactin. Figures 4; references 18: 7 Russian, 11 Western. [034-12172/5915]

PHYSIOLOGY

UDC 612.822.4+612.84+612.825

THERMOVISUAL INDICATORS OF BRAIN RESPONSE TO VISUAL STIMULI

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 12 Feb 85) pp 538-543

SHEVELEV, I. A., TSYKALOV, Ye. N., GORBACH, A. M., BUDKO, K. P. and  
SHARAYEV, G. A., Institute of Higher Nervous Activity and Neurophysiology,  
USSR Academy of Sciences, Moscow

[Abstract] Four adult males with normal vision were selected for a study to analyze thermovisual responses in the parietooccipital cortex to visual stimuli. Using noninvasive techniques of IR radiation recording, the thermographic patterns were converted into images by digital image processing technique to reflect the visual evoked response in specific cortical areas. The amplitude of the temperature response generally consisted of a +0.012 to +0.015 °C elevation. The significance and the physiological mechanism underlying the thermovisual indicators require further study, although they obviously have their origins in the cortical neurons involved with vision. The thermograms are taken to reflect neuronal (and perhaps glial) metabolic changes, although it is difficult to differentiate the strictly neuronal manifestations from those due to changes in local blood flow. With advances in thermosensor and image processing technology, it may be possible to apply such observations to the study of human brain function in the normal and pathological states. Figures 3; references 10: 6 Russian, 4 Western.  
[027-12172/5915]

UDC 612.822

NEURONAL RESPONSE AND EVOKED POTENTIALS IN SUBCORTICAL FORMATIONS IN VISUAL PERCEPTION. PART 1. PROBLEM FORMULATION AND PRINCIPLES OF SOLUTION

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 4 Mar 85) pp 563-575

KROPOTOV, Yu. D. and PONOMAREV, V. A., Institute of Experimental Medicine,  
USSR Academy of Medical Sciences, Leningrad

[Abstract] Neurophysiological studies were undertaken on 6 patients with Parkinsonism to assess the effects of the physical characteristics and logical denotation of visual stimuli on evoked potentials and rhythmicity of discharge in subcortical formations in relation to psychological testing modalities.

The electrodes were implanted in the various nuclei of the optic thalamus, the striopallidar system, and in some cortical areas of one or both hemispheres. The number of implanted electrodes ranged from 48 to 96. The patients were faced with the task of digit recognition and in making a designated response. Analysis of the electrophysiological data demonstrated that a portion of the neurons in the optic thalamus and the striopallidar system are involved in visual image perception. Their importance in such function is reflected in a change in the discharge frequency after a latent period of some 300 msec or more. However, the nature of the response was predicated on the type of activity that initiates the appearance of the visual stimuli. Figures 5; references 12: 10 Russian, 2 Western.

[027-12172/5915]

UDC 612.84

EFFECTS OF SPATIAL FREQUENCY FILTRATION AND ALPHABET LENGTH OF RESOLVABLE IMAGES ON PSYCHOPHYSIOLOGICAL ASPECTS OF PERCEPTION

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 29 Jun 84) pp 576-579

BORISOVA, Ye. D., Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] A two-channel tachyscope was employed for assessing image perception in three trained subjects in terms of spatial frequency filtration. Using an alphabet of six Arabic numerals demonstrated that differentiating features are represented by two features with low spatial frequencies, and that the most rapid perception (150 msec) occurs when two images are presented. A selection from among six images at the same frequency has a probability of correctness of 0.5 and requires 300 msec. Consequently, enlargement of the alphabet requires higher spatial frequencies for the formation of a visual image and its perception. Figures 2; references 6 (Russian).

[027-12172/5915]

UDC 612.825

PRESTIMULATORY EEG AND EVOKED POTENTIALS IN HUMANS ON IDENTIFICATION OF SIGNIFICANT LIGHT STIMULUS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 24 Jun 83) pp 580-585

POTULOVA, L. A. and VASIL'YEV, Ya. A., Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow

[Abstract] An analysis was conducted on the spectral correlational parameters of EEG in the prestimulatory period and in the evoked potentials that reflect successful recognition of meaningful light stimuli. The study was conducted on six male and female subjects in good health, with measurements obtained from the motor and visual cortex in response to presentation with numerical

stimuli. In case of correct identification there was an increase in the amplitude and a decrease in the latent period of negative evoked potential 140 component (N 140). In addition, in such situations the baseline or background neocortical potentials showed a decrease in the fraction of the slow waves in the total spectrum, and an increase in the rapid waves. Concomitantly, the cross-correlation coefficient in the left hemisphere decreased, while the corresponding parameter for the right hemisphere increased. Figures 4; references 23: 17 Russian, 6 Western.  
[027-12172/5915]

UDC 612.76

#### BIOMECHANICAL DETERMINATION OF PLANTAR FLEXOR FORCES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 24 Oct 83) pp 616-622

ZATSIORSKIY, V. M., ARUIN, A. S., PRILUTSKIY, B. I. and SHAKHNAZAROV, A. I., State Central Institute of Physical Culture, Moscow; Moscow Institute of Electronic Machine Construction, 2nd Moscow Medical Institute

[Abstract] A biomechanical approach was taken to an analysis of the lines of force of plantar flexor activity, through an analysis of the traction force of the triceps surae muscle and the resultant moment of force in the joint. The studies were conducted on 11 lower extremities obtained from male and female cadavers fixed in 10% formalin. The lines of force of the individual heads of the muscle showed maximal values within a rather narrow angular range (125-135°) of the talocrural joint, indicating that with one and the same traction force of the muscle the moment of force created by the triceps surae muscle varies about two-fold. These findings were in good agreement with previously reported data by other workers. Figures 4; references 26: 6 Russian, 20 Western.  
[027-12172/5915]

UDC 612.821

#### RESPIRATORY FUNCTION IN INHABITANTS OF NORTHEASTERN USSR

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 26 Dec 83) pp 634-640

MATVEYEV, L. N., MARACHEV, A. G., KOZIN, A. N., KHARKOV, S. A. and SHERES, I.Z., Institute of Human Morphology, USSR Academy of Medical Sciences, Moscow; Moscow Stomatological Institute

[Abstract] Respiratory function analysis was conducted on 246 inhabitants of Northeastern USSR with a mean stay of  $9.40 \pm 0.43$  years in the region, and 90 newcomers to the area from Moscow. The study groups consisted of both men and women with an average age for the cohort of  $31.4 \pm 0.51$  years. The long-term residents of the Northeast presented with inferior pulmonary function status in comparison with the newcomers, the deterioration consisting predominantly of

inferior gas-exchange parameters and reduction by a third in pulmonary reserve. Maximum gas exchange after 15 years in the Northeast was reduced by 45.4% below that seen for the newcomers, and by 27.6% in comparison with immigrants with a 5-year stay. The corresponding reductions in the pulmonary reserve capacity were 45.4 and 20.3%, respectively. The morphological basis of respiratory deterioration in the long-term residents of the Soviet Northeast was ascribed to marked hypertrophy and hyperplasia of the seromucous glands and the increase in the percentage of goblet cells. References 21:

19 Russian, 2 Western.

[027-12172/5915]

UDC 612.81

#### ADAPTATION TO HIGH ENVIRONMENTAL TEMPERATURE AND RESPIRATION IN YOUNG ATHLETES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 12 Nov 84) pp 641-644

KACHANOVSKIY, K. N., Turkman Pedagogic Institute imeni V. I. Lenin, Chardzhou

[Abstract] In order to assess the controversial reports regarding adaptation to high environmental temperatures and respiratory function, spirographic studies were conducted on 12 (11-12 years) boys undergoing endurance training for running. The experimental group trained during daytime with temperatures ranging from 39.3-46.0°C, and the control group in the evening with temperatures in the 24.9-28.0°C range. Studies conducted over a three-month period (June, July, August) showed pulmonary function improvements in both groups, with the improvements in respiratory function being more pronounced in the experimental group of boys. For example, in August the pre- and postexercise  $\dot{V}_{O_2}$  for the

experimental group was 458 and 609.3 ml/min, respectively, whereas the corresponding values for the control group were 598.5 and 762.0 ml/min. The data indicated that the experimental group of boys presented with superior anti-hypoxic responses and more efficient energy expenditures in physical exertion. Figures 1; references 8 (Russian).

[027-12172/5915]

UDC 612.461

#### EFFECTS OF 24 h SLEEP DEPRIVATION ON BIOGENIC AMINE METABOLISM

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 19 Feb 84) pp 652-656

BOLSHSKOVA, T. D., MESHCHERYAKOVA, S. A., TYABENKOVA, V. F., ROMANOVA, N. I., LEVIN, Ya. I. and DALLAKYAN, I. G., 1st Moscow Medical Institute imeni I. M. Sechenov

[Abstract] An analysis was conducted on the effects of 24 h sleep deprivation on the metabolism of catecholamines, histamine and serotonin and the completion of recovery after a night's sleep. Measurements of the blood and urine levels

of the metabolites in question were conducted on ten healthy males ranging in age from 22 to 27 years. Sleep deprivation of the specified duration resulted in enhanced production and secretion of the biogenic amines, as evidenced by elevated urinary levels. In addition, psychological tests during that time showed a positive correlation between changes in the metabolism of the biogenic amines and behavioral performance. Comparison of blood and urine levels demonstrated that the latter status provided a more reliable indication of histamine status. It was also noteworthy that serotonin levels were most refractory to recovery after sleep deprivation, and the connection between depressed levels of serotonin and mental depression after repeated bouts of sleeplessness appears to establish a direct metabolic relationship.

References 26: 11 Russian, 15 Western.

[027-12172/5915]

UDC 612.821.8

#### VISUAL FORM PERCEPTION FROM HALFTONE IMAGES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 25 Mar 84) pp 687-689

KUPERMAN, A. M. and KRAVTSOV, A. B., Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] Two subjects were employed in an experiment designed to test visual form perception from halftone images and evaluate the importance of orientation-selective mechanisms in this function. Analysis of the resultant data indicated that the threshold time limit for perception of the volume parameter from halftone images is on the order of 70 to 180 msec, and depends on the mutual orientation of the test and masking meshwork stimuli to one another. The latency increases with orthogonal orientation. The data were interpreted to indicate that orientational and spatial-frequency selective mechanisms are involved in surface form perception from halftone images. These mechanisms can be differentiated into local factors involving evaluation of intensity gradient of the test image, i.e., orientation of the normal to the surface, and non-local factors concerned with analysis of contour-boundary characteristics.

References 3 (Russian).

[027-12172/5915]

ENHANCEMENT OF SOMNIFEROUS EFFECTS OF THERMAL PULSATION BY SIMULTANEOUS APPLICATION TO TWO REFLEXOGENIC ZONES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 4, Jul-Aug 85  
(manuscript received 28 Nov 83) pp 689-691

LIKHTENSHTEYN, V. A. and MUGUTDINOV, T. M., Daghestan Medical Institute, Makhachkala

[Abstract] The somniferous effectiveness of simultaneous application of thermal pulses to two reflexogenic zones was tested on 33 healthy young adults, and compared with the results obtained when only the standard zone (nasolabial) or an adjunct zone (paraumbilical abdominal area) were stimulated. Depth of induced sleep was monitored by EEG. The results demonstrated that sleep induction was most effective when the two zones were simultaneously activated by thermal pulses, with 78.8% of the subjects reaching stage 2 sleep in 9.1 min on the average. In this mode only 6.1% of the subjects failed to respond. Stimulation of only the primary nasolabial zone resulted in 60.7% of the subjects entering stage 2 sleep in 12.7 min, while 15.1% failed to respond at all. Stimulation of the paraumbilical alone was least effective, with 36.3% of the subjects failing to respond and only 20.6% reaching stage 2 in 16.8 min. References 4 (Russian).

[027-12172/5915]

PROBLEM OF BIOLOGICAL CLOCKS. NEW DATA ON CIRCADIAN CHANGES IN STATUS OF HUMAN ORGANISM

Moscow BIOFIZIKA in Russian Vol 30, No 4, Jul-Aug 85  
(manuscript received 2 Jan 84) pp 717-720

GLYBIN, L. Ya., Vladivostok Medical Institute

[Abstract] A possible biochemical mechanism has been suggested for endogenous intracellular clocks, suggesting that the biological clock is not a simple two-phase day and night clock, but rather a more complex sequence of circadian changes. This article summarizes results obtained by the author in a statistical analysis of the circadian rhythm of processes of morbidity, childbirth, domestic injury, traffic accidents and death due to certain diseases. The major result is that various physiological indices of the human body change during the course of the day in a quite complex manner with a regular sequence of phases of increased and decreased intensity of the processes studied. The picture was found to be the same in terms of local time regardless of season of year, latitude or location. Five periods of elevated physiological tone were observed, at 5-6, 11-12, 16-17, 20-21 and 24-1 o'clock, with an equal number of decreases (at 2-3, 9-10, 14-15, 18-19 and 22-23 o'clock). Figures 3; references 19 (Russian).

[2092-6508/5915]

UDC 616-084.3:008

IMPROVEMENT OF MEDICAL PREVENTIVE EXAMINATIONS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 8, Aug 85 pp 9-11

[Article by V. S. Preobrazhenskaya, V. D. Bayda, and B. I. Reznikov, All-Union Scientific-Research Institute of Social Hygiene and Health Organization imeni N. A. Semashko, USSR Ministry of Health; Donetsk Oblast Department of Health]

[Text] Preventive examinations that are performed at considerable expenditures of time and money are not sufficiently thorough and effective in their present form of organization.

The essential conditions for the subsequent greater efficiency of medical preventive examinations of the public include a better quality of diagnostics, proper and concise organization, obligatory comprehensive medical service for workers at industrial enterprises, timely clinic registrations, and the fulfillment of therapeutic and health improvement measures.

Work on further improvements in public medical-sanitation maintenance, particularly in the improvement of dispensary-polyclinic assistance, is being carried out in the Donetsk Oblast which is a major industrial center with highly developed coal, metallurgical, machine-building, chemical, and other industries. During the past five years territorial treatment and plant medical divisions have been subdivided, and an additional 24 oncological, 10 cardiological, 18 rheumatological, 6 gastroenterological, and 3 endoscopic offices have been opened. In order to improve specialized medical services, 34 inter-rayon specialized departments have been organized along with 35 specialized centers and the opening of polyclinics (departments) for medical preventive examinations in Donetsk, Druzhkova, Gorlovka, Yenakiyevo, Zhdanov, Makeyevka, Shaktersk, and Khartsyzsk. The oblast has gained considerable experience in the conduct of preventive examinations, and ways of further improving their organizational forms are being planned.

The primary tasks of preventive examinations is the early recognition of diseases and premorbid conditions, the recording of medical findings on the health of individuals and their occupational suitability, the completion of medical preventive examinations in the shortest possible time, the organization and implementation of measures for sanitation and hygiene instruction for industrial enterprise workers, and the espousal of a healthy life style.

As is known, there are three types of preventive medical examinations: The preliminary examinations, given upon initial employment; the periodic examinations which account for special features of individual industrial sectors; and the special purpose examinations for detecting individual types of diseases. The frequency of examinations, the scope of investigations, and the number of specialists participating in the examinations are determined in accordance with documents approved by the USSR Ministry of Health.

Personnel for specialized institutions and departments have been organized as a result of redistributing the staffs of therapeutic-prophylactic institutions through the replacement of duty positions.

In order to improve the organizational forms of preventive medicine and increase its efficiency we studied the operations of the Makeyevka Polyclinic for Preventive Medical Examinations and the preventive medical examinations departments of the central municipal hospital in the city of Druzhkovka.

The polyclinic has departments for preliminary preventive examinations, preventive examinations for persons obligated to have medical examinations (self-supporting department), photofluorographic, auxiliary-diagnostic subdivisions, and mobile medical teams for conducting medical examinations at enterprises.

The total number of persons obligated to undergo preventive examinations is determined by contracts that are concluded once every three years between the municipal department for medical examinations and the corresponding institutions. Check lists of institution workers are presented quarterly. An examination schedule which indicates both the daily and hourly work load is sent to all institutions in order to regulate the number of persons to be examined and to reduce the amount of time required for the examinations. The average work load of a department is 250 to 300 persons a day. The average length of an examination is one or two days (this was five to six days prior to the organization of a specialized subdivision). The shortened examination time is explained by the fact that as the patient goes from one office to the next, he is immediately examined by all specialists, and undergoes the photofluorographic, laboratory, and functional tests (as indicated) on the same day. As a whole, the examination procedure has been rather well thought out. The results of an examination are recorded as soon they become known.

The polyclinic has a public health physician whose function is to control the reliability of the examination, its completeness and timely execution (in accordance with the existing work schedule). If the examination schedules are not followed, he undertakes individual work with the patients and the administration of the institution which failed to make sure that the persons showed up for examinations on time.

The centralization of Makeyevka's photofluorographic services has contributed to an improved quality of examinations, their greater scope, and better administration. The X-ray-photofluorographic department which undertakes preventive examinations for all of the city's population, has 12 inpatient photofluorographic laboratories (10 in the city polyclinics and two in the polyclinic for preventive examinations), and five mobile units. A centralized laboratory has been organized to develop the fluorographic film which makes it possible to eliminate film waste, to reduce the consumption of chemical reagents by 30 percent, and to increase the productivity of radiologists and x-ray technicians.

The department for preventive public medical examinations in the city of Druzhkovka was created directly within the City Central Hospital. The department undertakes medical examinations for assigned quotas of laborers and office personnel when they begin their employment, periodic examinations for persons under active observation, examinations for certain healthy contingents of the public, medical examinations for transportation drivers before they go on the road, etc.

The department is currently expanding its primary preventive program. This entails the recognition of premorbid risk factors with regard to cardiovascular diseases as determined by the (Rouze) questionnaire, the development of a "Special Purpose Five-Year Program of Preventive Medicine," and a plan to change the department's area of activity and expand its functions that would be accompanied by a change in its name to a "Health Center." No less an important aspect of the department's activity is its systematic coordination of all preventive medicine measures in the city.

A permanent council for preventive medicine problems has been organized in the city. The council is headed by the deputy chief of the city's health department. Problems concerning the organization of preventive medicine measures and follow-up examinations for persons in whom disease is suspected are examined at the council every month. In addition, the effectiveness of measures undertaken to improve the organization and quality of therapy are evaluated.

Warranting particular attention is the standardization and setup of records and report documentation that employs the use of punch cards at the Makeyevka Polyclinic and the BC-1022 computer at the department for preventive medical examinations in the city of Druzhkovka. These technological methods are helpful in evaluating the results of preventive examinations for many parameters in an operative fashion, such as a record

of persons who have not had a medical examination, a record and analysis of detected pathology, and control over the completeness and quality of work being undertaken. Automated systems are being utilized more broadly to administer preventive medical examinations and to create a data bank on the health of each city inhabitant.

All of the foregoing as well as our own experience in the conduct of public medical examinations in the Donetsk Oblast and the activity of the therapeutic-prophylactic institutions are indicative of the need to improve the system of actively supervising the healthy and practically healthy contingent. The public health organs and institutions must base their work on the principle of according priority service to industrial enterprise workers. The examinations of new workers and of those who are working as a whole in a number of industrial sectors (coal, metallurgical, etc.) and of persons employed at a plant where medical examinations are obligatory for industrial safety and the prevention of disease, must be performed by physicians who are well acquainted with the characteristics of the plant or manufacturing process. It would be most desirable for the examinations to include the participation of plant shop physicians who actively inspect the assigned contingents of workers, the social-hygienic working and living conditions, and who can detect various diseases in their early stages, etc.

The following are possible errors that can occur in the work of independent polyclinics for preventive medical examinations:

- overestimation of new morbidity cases because of duplicated pathology records, and the listing of previously diagnosed cases as first-time cases;
- low quality of examinations because of ineffective patient observation, a lack of out-patient records for persons with a recognized disease, the frequent unwillingness of a patient to complain about illness because of his desire to retain his job at a certain enterprise, and insufficient information on the part of city polyclinic physicians about special plant features;
- a breakdown in continuity between a polyclinic for preventive examinations and other therapeutic-prophylactic institutions because of an insufficiently developed system of information transmission, irregular transmittal of examination findings to territorial polyclinics and medical-sanitation units, delayed notification to examined patients about pathological findings and exacerbation of chronic illness, etc.

The above-indicated shortcomings are practically nonexistent in the departments for preventive medical examinations that are part of therapeutic-prophylactic institutions where the continuous operation of individual subdivisions has been established, where there are no marked flaws in diagnostic procedures or the recording of illnesses, where the plant shop physician undertakes the examination of new employees as well as the active observation of the workers' health, and where the quality and completeness of examinations are better.

One can conclude from the foregoing that the departments for preventive medical examinations that are part of polyclinics, medical-sanitation units, and hospitals that are organized with due regard to the regional characteristics of setting up a network of therapeutic-prophylactic institutions, constitute the preferable organizational form of preventive medicine.

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6289

CSO: 1840/029

BRIEF

MOBILE NARCOLOGICAL UNIT--The addresses of Riga's garage cooperatives, vehicle services and open parking lots are included in the fixed route of one of the city's emergency ambulances. This ambulance minibus functions as a mobile narcological laboratory on the streets of Latvia's capital. Its purpose is to ascertain whether or not owners of private automobiles, as they drive out onto the street in the morning, are fit to be behind the wheel. The medics of this service also check drivers from small vehicle services which do not have their own stationary narcological units. "The first comments of enterprise managers, as well as admissions from 'patients', speak of the benefit of our high-speed laboratory," says head narcologist of the republic, Ya. Strazdyn'sh. "The vehicle with the red cross and loud speaker on its roof can appear at any moment before a driver. An examination determines in a matter of seconds if, and to what extent, there is intoxication and thus prevents a road accident." [By G. Grishina, correspondent for TASS] [Text] [Moscow TRUD in Russian 14 Aug 85 p 3] 12793/5915

CSO: 1840/2071

PSYCHOTHERAPY AGAINST ALCOHOLISM

Moscow LESNAYA PROMYSHLENNOST in Russian 20 Aug 85 p 4

POPRYDKIN, M., Feodosiya

[Abstract] For 35 years Aleksandr Romanovich Dovzhenko, head of the Republic Drug Addiction Psychotherapeutic Center of the Ukrainian SSR Ministry of Health, has successfully treated alcoholics by a method that has now been fully vindicated. The approach consists of a 2-3 h psychotherapy session in which the alcoholic's will to overcome the need for a drink is brought to the fore. During the session Dovzhenko makes a patient fully aware of the effects of alcohol on his body and his environment, and instills a desire for a better way of life with a firm commitment not to drink for a defined period of time of the patient's choosing. Much of the success rests on the physician's combination of a lecture, of discussion and incisive insight, which induces in the patient the will to succeed. Dovzhenko places emphasis on the management of alcoholics rather than, say, smokers, since he feels the former are much more damaging to Soviet society.

[2084-12172/5915]

UDC 614.2(575.4)

## DEVELOPMENT OF PUBLIC HEALTH CARE IN TURKMENISTAN

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 8, Aug 85  
(manuscript received 16 Nov 84) pp 25-29

[Article by K. B. Chagylov, Turkmen SSR Minister of Health]

[Excerpts] During the years of Soviet rule Turkmenistan has been transformed into a socialist republic with a developed industry and agriculture. Today the leading industrial sectors of the republic are the electric power industry, the gas-producing industry, the petroleum and petroleum refining industries, the chemical, light, cotton ginning, and construction industries, and the production of mineral fertilizers. Vast transformations have taken place in agriculture. Great advances have been achieved in the cultural development and improvement of the workers' well being.

These sweeping social transformations have created favorable conditions for the development of public health care which is today supported by a powerful material-technical base with a developed network of therapeutic-prophylactic institutions equipped with modern medical technology and skilled personnel. Highly effective medicinals are now provided in sufficient quantity to the public and the therapeutic-prophylactic institutions.

At the present time there are 275 hospitals and 447 out-patient polyclinics in Turkmenistan. The hospitals have 32,570 beds which is 104.3 beds per 10,000 persons. In addition, there are 60 first aid and emergency stations and departments, five departments for emergency and planning-consultative assistance at the oblast and republic hospitals, 66 medical epidemiological stations, 1,173 feldsher-midwife points, and 180 feldsher health centers at industrial enterprises.

There are about 9.5 thousand physicians and more than 26 thousand middle grade medical personnel at work in the republic which represents a ratio of 30.3 physicians and 83.3 middle grade medical personnel per 10,000 persons. The per capita ratio of physicians here is significantly greater than in England, Japan, France, India, the USA, Italy, and the FRG. The republic is also ahead of England, the USA, Iran, India, etc., with respect to the number of hospital beds per 10,000 persons of the population.

The reorganization of small sector hospitals and feldsher-midwife centers into medical out-patient clinics is continuing to the point where there are now 107 such clinics and 1,173 feldsher-midwife centers.

Medicines are being supplied to health institutions and the public by approximately 280 pharmacies of which 124 are in rural areas (in 1924 there were seven pharmacies). There are 1.5 thousand pharmaceutical personnel in the pharmacy network, including more than 350 pharmacists. In order to provide medicinal assistance to the rural population, 761 apothecary stations have been organized for the sale of packaged medicinals, and sanitation and hygiene items.

In accordance with the decisions of the June (1983) Plenum of the CPSU Central Committee, the introduction of annual preventive examinations for the entire population has been initiated. This marks a new stage in the development and realization of the preventive medicine thrust in our country.

The medical personnel for the republic are being trained by the Turkmen Medical Institute with the school for advanced physician training, the Central Scientific-Research Laboratory, four oblast and one Ashkhabad city secondary medical school. The republic has seven scientific-research institutes, and there are two academicians and two corresponding members of the Turkmen Academy of Sciences working successfully in the republic along with 37 doctors of medical sciences and about 400 candidates of sciences. They are carrying out research in vital areas of medical science and practice and are working out fundamental theoretical and applied study topics.

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CSO: 1840/029

RADIATION BIOLOGY

AWARD NOMINATION FOR STUDY OF CELL DEATH IN RADIATION SICKNESS

Moscow IZVESTIYA in Russian 30 Aug 85 p 3

IVANITSKIY, G., corresponding member of the USSR Academy of Sciences, laureate of the Lenin and USSR State Prizes

[Abstract] The author discusses the importance of the work entitled "Formulation of Theoretical Bases of the Phenomenon of Cell Death and Their Use in Explaining the Pathogenesis of Radiation Sickness", which has been nominated for the 1985 USSR State Prize. He notes that the study of the nature and mechanisms of cell death from ionizing radiation consumed the efforts of researchers of various specialties for more than 20 years. These researchers worked at the USSR Academy of Sciences' Institute of Biological Physics, the USSR Academy of Medical Sciences' Institute of Medical Radiology, and the USSR Ministry of Health Institute of Biophysics and Central Scientific Research Institute of Roentgenology and Radiology. The author observes that study of the molecular basis of the high radiosensitivity of lymphocytes became the key to understanding the general biological phenomenon of cell death.

FTD/SNAP  
/5915  
CSO: 1840/016

ORDER FOR HEALING

Moscow IZVESTIYA in Russian 31 Aug 85 p 3

TSIKORA, S., Special Correspondent

[Abstract] The UkrSSR Minister of Health, A. Romanenko told the staff, in the Ministry's Collegium that the population complains in general about the limited availability of qualified medical personnel in spite of all the progress in diagnosis and treatment and the money injected by the government. The incidence of most prevalent diseases has not been lowered. Academician of the UkrSSR Academy of Sciences, N. Amosov stated that the principle "no complaints--good performance, many complaints--poor work" should not be used in medicine. The goal should be to have scientific research institutes providing specialized help. For example, this was done at the Kiev Scientific Research Institute of Clinical and Experimental Surgery, where the scientists took over the responsibility for treating gastro-intestinal and vascular diseases. In seven years they increased the number of treated patients from 5,000 to over 7,000 per year. In addition, surgical procedures were taught at rayon and local hospitals, expanding the medical expertise country-wide. As a result, post-operative mortality decreased 10-fold and invalidity about 8-fold. Similar results were obtained in the cardiovascular area. The goal of the scientific research institutes is to teach new methods and expand the range of technical applications. Also, the planning and financing of scientific studies must be drastically changed: public health officials should suggest topics for research in accordance with the needs of the population. Some procedures should be available at every center, others could be limited to a few specialized hospitals. No center should exist in total isolation from the population. About 20-25% of the budget should be allocated for directed research and 20-25 for independent studies.

[2083-7813/5915]

CONFERENCES

CONFERENCE ON PROBLEMS OF NEUROCHEMISTRY

Kiev PRAVDA UKRAINY in Russian 15 Sep 85 p 3

[Text] Biochemical models for the study of nerve cells have been developed at the Ukrainian Academy of Sciences' Institute of Biochemistry imeni Palladin. Using these models, scientists will be able to study mechanisms of the human brain. This was reported at the All-Union Conference on Timely Problems of Contemporary Neurochemistry, which concluded in Kiev on September 13. Leading scientists of Moscow, Leningrad and the Union republics took part in the conference.

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CSO: 1840/017

CONFERENCE AT NEW ALCOHOLISM RESEARCH CENTER

Moscow IZVESTIYA in Russian 6 Sep 85 p.3

[Article by O. Sukhanov, Irkutsk]

[Text] Neuropathologists, psychiatrists and narcologists of Moscow, Leningrad and other cities of the Russian Federation, and also from Kiev, have gathered in Irkutsk for their fifth congress.

The place where this forum is being held was not chosen at random. At the Irkutsk State Medical Institute, a unique scientific center for the study of biochemical processes of alcoholism has been created, and the attention of the scientists and the physicians will be focused on the fight against this evil.

At the congress, the participants are discussing experience with the operation of centers at industrial enterprises where alcoholics can be treated successfully without leaving their jobs.

FTD/SNAP

/5915

CSO: 1840/016

UDC 616.9-02-036.22:061.3(47+57)"1984"

ALL UNION CONFERENCE ON 'MOLECULAR BIOLOGY, GENETICS AND IMMUNOLOGY OF PATHOGENIC AGENTS OF EXTREMELY DANGEROUS INFECTIONS'

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 85 pp 117-118

LEBEDEVA, S. A. and RAKIN, A. V.

[Abstract] The conference was held 15-17 February at the Rostov-na-Donu State Scientific Research Antiplague Institute (Director, professor V. N. Milyutin), with 243 participants who presented over 80 reviews, original papers and exhibits. The following sections were organized: immunology; bacteriophages (restriction and modification); analysis and transfer of genetic material by the pathogens of extremely dangerous infections (EDI); analysis and characteristics of the plasmids of EDI pathogens; and virulence of EDI pathogens. Problems facing the researchers were brought up; need was stressed for more effective epidemiological surveys, development of new vaccines and diagnostic kits. Modern methodology of hybridomas and monoclonal antibodies along with immunoenzymatic techniques must be applied in this area. Mechanisms of virulence should be studied on molecular and cellular levels. A general summary of the reviews and papers is reported. Some points needing further resolution were identified: unification of *Y. pestis* plasmid nomenclature, expansion of immunogenetic studies and discussion of the taxonomic position in regard to the pathogenic agents of plague.

[2096-7813/5915]

UDC 57.088

SYMPOSIUM XVIII ('BIOTECHNOLOGY') AT 16-TH FEBS CONFERENCE, 25-30 JUNE 1984, MOSCOW

Moscow BIOKHIMIYA in Russian Vol 50, No 5, May 85 pp 873-874

BEREZIN, I. V.

[Abstract] There were 113 delegate-participants at the symposium from 22 countries. Three plenary sessions were held by leading Western scientists: Mosbach, Fukui and Hall. In addition, there were eight symposium lectures and three lectures selected by the organizing committee from the poster sessions. Also, there were two round table discussions on new enzyme isolation methods,

thermally stable enzymes, cofactor regeneration, etc. J. Lash from the German Democratic Republic discussed synthesis and stability of immobilized enzymes. The losses incurred during immobilization were related to chemical binding of the enzyme with the carrier particles. The paper by G. K. Skryabin and Ye. L. Golovleva discussed contribution of microbiology to modern biotechnology, especially commercial production of food yeasts. Solid phase fermentation processes being developed in the USSR were discussed, the product of which consisted of nutritionally poor plants enriched with microbial biomass. K. Martinek reported on catalytic properties of enzymes solubilized in colloidal water suspensions in organic solvents. In such media the enzymes are found in microsurroundings imitating conditions in living cells. They noted that on mycellae, the enzymes showed much higher activity than in water solutions. I. V. Berezin presented a paper on "Biotechnology of solar energy conversions", showing that the biophotolysis process of water with formation of molecular hydrogen and oxygen under the influence of microscopic algae and bacteria may be the process closest to the biotechnological scaling among all known processes of the conversion of solar energy to fuel.

[2066-7813/5915]

MISCELLANEOUS

BRIEF

INDIAN OCEAN BIOLOGICAL RESOURCES--Soviet scientists have concluded their 2-year program of exploring biological resources in the parts of the Indian Ocean adjoining Mozambique and the People's Democratic Republic of Yemen. They compiled an atlas of the major fish species in the region and determined the spots where fishing can be the most profitable. The research materials will be granted to Mozambique and the People's Democratic Republic of Yemen. [Text] Moscow World Service in English 0700 GMT 14 Sep 85] 5915

CSO: 1840/017

NEW BUILDING PROVIDED FOR PHYSICAL CHEMISTRY UNIT OF KIEV MEDICAL INSTITUTE

Kiev PRAVDA UKRAINY in Russian 4 Sep 85 p 3

[Article by Yu. Vilenskiy]

[Excerpt] A new physical-chemistry building at the Kiev Medical Institute will become a facility for delving into the exact sciences.

It has become the home of the institute's chairs of instruction in the chemical sciences, as well as pharmacology and medical and biological physics. The central scientific research laboratory also has moved here.

The institute's president, Corresponding Member of the USSR Academy of Medical Sciences Ye. I. Goncharuk, said the new building greatly augments the medical science center for future physicians.

FTD/SNAP

/5915

CSO: 1840/017

- END -